User's Manual

POWERCERT

Model PR300
Power and Energy Meter

IM 77C01E01-01E

vigilantplant.™

YOKOGAWA
Yokogawa Electric Corporation

IM 77C01E01-01E
1st Edition

Model PR300 Power and Energy Meter

IM 77C01E01-01E

Contents

Introduction i
Notices ii
Checking the Package iii
■ **Checking the Model and Suffix Codes** iii
■ **Checking the Accessories** iv

Chapter 1 Installation and Wiring
1.1 **Installation with the ANSI 4-inch Round Form or JIS 110-square Instrument Size** 1-1
External Dimensions 1-1
Panel Cutout Dimensions 1-1
Mounting Method 1-2
1.2 **Installation with the DIN 96-square Instrument Size** 1-3
External Dimensions 1-3
Mounting Method 1-4
1.3 **Wiring** 1-5
Crimping Terminal Recommendations 1-5
Single-phase two-wire system (voltage input, current input, power supply) 1-6
Single-phase three-wire system (voltage input, current input, power supply) 1-6
Three-phase three-wire system (voltage input, current input, power supply) 1-6
Three-phase four-wire system (voltage input, current input, power supply) 1-7
Three-phase four-wire system (2.5 element) (voltage input, current input, power supply) 1-7
Other Wiring 1-8
1.4 **Attaching the Dust Cover and Terminal Cover** 1-9

Chapter 2 Preparations before Starting Measurement (Set up the PR300 First)
2.1 **Component Names and Functions** 2-1
2.2 **Setting the Phase and Wire System** 2-2
Range of Phase and Wire System Options 2-3
2.3 **Setting the Voltage Range** 2-4
Range of Voltage Range Options 2-5

Chapter 3 Parameter Setting Operations
3.1 **Basic Parameter Setting Operations** 3-1
Methods of Changing Parameter Setpoints 3-1
3.2 **Setting the VT and CT Ratios** 3-2
Setting the VT Ratio 3-2
Setting the CT Ratio 3-3
3.3 **Setting the Integrated Low-cut Power** 3-4
3.4 **Setting RS-485 Communication Conditions** 3-6
3.5 **Setting Ethernet Communication Conditions** 3-8
3.6 **Setting Pulse Output Conditions** 3-10
3.7 **Setting Analog Output Conditions** 3-12
3.8 **Setting Demand Measurement Conditions** 3-14
3.9 **Setting the Measured Value Display Pattern** 3-16
3.10 **Setting the "Indicator-out" Mode and Locking Parameters** 3-19
Setting the Indicator-out Mode 3-19
Locking and Unlocking Parameters 3-20

Chapter 4 Operation for Display of Measurement Items and Measurement Method

4.1 Measurement Items 4-1
4.2 Switching Display Pattern 4-2
Switching Display Pattern 4-2
Example Display Patterns and Initial Values 4-2
4.3 Displaying Measured, Instantaneous, and Maximum/Minimum Values 4-3
Example Display and Measuring Ranges of Active Power (Regenerative Power) 4-3
Example Display and Measuring Ranges of Reactive Power 4-3
Example Display and Measuring Ranges of Apparent Power 4-3
Example Display and Measuring Ranges of Voltage 4-4
Example Display and Measuring Ranges of Current 4-4
Example Display and Measuring Ranges of Power Factor 4-4
Example Display and Measuring Ranges of Frequency 4-5
How to Switch between Instantaneous Value, Maximum Value, and Minimum Value 4-5
4.4 Phase Switching for Voltage and Current 4-6
How to Switch the Phase for Single-phase Three-wire, Three-phase Three-wire and 4-6
Three-phase Four-wire (2.5 element) Systems 4-6
How to Switch the Phase for Three-phase Four-wire System 4-6
How to Read the Phase Indication Lamp 4-6
4.5 Displaying Energy Values 4-7
Example Display and Measuring Ranges of Active Energy and Regenerative Energy 4-7
Example Display and Measuring Ranges of LEAD Reactive Energy and LAG Reactive Energy 4-7
Example Display and Measuring Ranges of Apparent Energy 4-7
Operation for Energy Value Display 4-8
Optional Integrating Function 4-9
4.6 Resetting Measured Values 4-10
Resetting Maximum and Minimum Values 4-10
Resetting Energy Value 4-10
Canceling Resetting 4-11
Reset Items and Details 4-11
4.7 Demand Measurement (Optional Measuring Function) 4-12
Example Demand Display and Measuring Ranges 4-12
Demand Measurement Procedure 4-12
Operation for Demand Measurement 4-13
Demand Alarm 4-14
Example Demand Measurement 4-14

Chapter 5 Troubleshooting

5.1 Error Display and Recommended Response 5-1
Error at the Time of Turning on the Power 5-1
Errors during Operation 5-1
5.2 Maintenance 5-2
Cleaning 5-2

Appendix

Appendix 1 Specifications of PR300 ..... A-1
Measuring Function A-1
Power Items and Equations A-2
Input Specifications A-2
Digital Input Specifications A-3
Analog Output Specifications (additional output function) A-3
Pulse Output Specifications (additional output function) A-3
Demand Alarm Output Specifications (optional measuring function) A-4
Communication Specifications A-4
Standard Performance A-6
Compliance with Safety and EMC Standards A-7
Environmental Conditions A-8
Mounting and Shape A-8
Related Products (sold separately) A-8
Appendix 2 System Reset A-9
Appendix 3 Parameter Setting Procedure A-10
Appendix 4 Parameter List A-12
Appendix 5 Alphanumeric Characters Table for 7-segment LED A-16

Index

Introduction

Thank you for purchasing the PR300 Power and Energy Meter.
This manual provides information about the procedure for installing, wiring and operating the PR300 Power and Energy Meter, as well as precautions for handling the meter. Read this manual carefully before use, in order to use the product correctly and safely.

■Related Documents

The following user's manuals all relate to the PR300 Power and Energy Meter. Read them as necessary.

Printed manuals (Electronic manuals [PDF files] are also provided on the accompanying CD.)

Model PR300 Power and Energy Meter Startup Manual <Installation>	Document number: IM 77C01E01-02E
Model PR300 Power and Energy Meter Startup Manual <Initial Setup Operations>	Document number: IM 77C01E01-03E

Electronic manual (PDF file)

Model PR300 Power and Energy Meter Communication Interface User's Manual (RS-485 and Ethernet Communications)	Document number: IM 77C01E01-10E

■Notes on This Manual

- The contents of this manual are subject to change without prior notice for reasons of performance and/or functional enhancements.
- Every effort has been made to ensure accuracy in the preparation of this manual. Should any errors or omissions come to your attention however, please contact your nearest Yokogawa branch or sales office.
- Reprinting and reproducing the contents of this manual either in part or in their entirety, is prohibited without the prior consent of Yokogawa.
- The document concerning TCP/IP software has been created by Yokogawa based on the BSD Networking Software, Release 1 that has been licensed from the University of California.

■Trademark

- All the brands or names of Yokogawa Electric's products used in this manual are either trademarks or registered trademarks of Yokogawa Electric Corporation.
- Ethernet is a registered trademark of XEROX Corporation in the United States.
- Company and product names that appear in this manual are trademarks or registered trademarks of their respective holders.

■Documentation Conventions

Symbols

This manual uses the following symbols.

●Symbols Used in the Main Text

NOTE

Draws attention to information that is essential to understanding the operation and/or features of the product.

TIP

Gives additional information to complement the present topic.

See Also

Gives reference locations for further information on the topic.

■Description of Displays

(1) Some of the representations of product displays shown in this manual may be exaggerated, simplified, or partially omitted for reasons of convenience when explaining them.
(2) Figures and illustrations representing the PR300's displays may differ from the real displays in regard to the position and/or indicated characters (uppercase or lowercase, for example), the extent of difference does not impair a correct understanding of the functions and the proper operations and monitoring of the system.

■Revision Information

1st Edition: February, 2006

Notices

■Regarding This User's Manual

- This manual should be passed on to the end user. Keep the manual in a safe place.
- Read this manual carefully to gain a thorough understanding of how to operate this product before you start using it.
- This manual is intended to describe the functions of this product. Yokogawa Electric Corporation (hereinafter referred to as Yokogawa) does not guarantee that these functions are suited to the particular purpose of the user.
- Under absolutely no circumstances may the contents of this manual, in part or in whole, be transcribed or reproduced without prior consent.
- The contents of this manual are subject to change without prior notice.
- Every effort has been made to ensure accuracy in the preparation of this manual. Should any errors or omissions come to your attention however, please contact your nearest Yokogawa representative or our sales office.

■Regarding Protection, Safety, and Prohibition Against Unauthorized Modification

- In order to protect the product and the system controlled by it against damage and ensure its safe use, be certain to strictly adhere to all of the instructions and precautions relating to safety contained in this document. Yokogawa does not guarantee safety if products are not handled according to these instructions.
- The following safety symbols are used on the product and/or in this manual.

● Symbols Used on the Product and in This Manual

CAUTION

This symbol on the product indicates that the operator must refer to an explanation in the user's manual in order to avoid the risk of injury or death of personnel or damage to the instrument. The manual describes how the operator should exercise special care to avoid electric shock, electrocution or other dangers that may result in injury or loss of life.

Protective Grounding Terminal

This symbol indicates that the terminal must be connected to ground prior to operating the equipment.

CAUTION

● Power supply
Check that the voltage of the power supply agrees with the rated supply voltage of the Meter.

● Protective grounding
To avoid electric shock, be sure to provide protective grounding before turning on the Meter.

● Need for protective grounding
Do not cut the internal or external protective grounding conductor of the Meter or disconnect the conductor from the protective grounding terminal. In either case, the protective functions of the Meter will become ineffective, resulting in a hazardous situation.

● Defect of protective grounding
If the protective functions of protective grounding or fuses are assumed to be defective, do not operate the Meter. Before putting the Meter into operation, check that the protective functions are normal.

● Use in a gaseous environment
Do not put the Meter in operation in a location where any combustible or explosive gases or fumes are present. It is extremely dangerous to use the Meter under such conditions.

● Removal of casing
No person except Yokogawa service personnel is allowed to remove the casing. Removing the casing is hazardous since the Meter contains high-voltage parts.

● External wiring
Securely provide protective grounding before wiring the Meter to the measuring object or external control circuit.

● Damage to protective construction
Operating the Meter in a way not described in this manual may impair the protective construction of the Meter.

■Force Majeure

- Yokogawa does not make any warranties regarding the product except those mentioned in the WARRANTY that is provided separately.
- Yokogawa assumes no liability to any party for any loss or damage, direct or indirect, caused by the use or any unpredictable defect of the product.
- Be sure to use the spare parts approved by Yokogawa when replacing parts or consumables.
- Modification of the product is strictly prohibited.
- Reverse engineering such as the disassembly or decompilation of the product is strictly prohibited.
- No portion of the product supplied by Yokogawa may be transferred, exchanged, leased, or sublet for use by any third party without the prior permission of Yokogawa.

Checking the Package

Verify the package as explained below before starting to use the product. Should the delivered product be wrong or the package be missing any item, contact the vendor from which you purchased the product.

■Checking the Model and Suffix Codes

The PR300 bears a nameplate. Confirm that “MODEL” and “SUFFIX” (suffix codes) shown on the nameplate agree with those of the product ordered.

Model	Suffix Codes	Description
PR300	-□ □ □ □ □ -6 □ -0	Power and Energy Meter
Phase and wire system	-3	Universal three-phase three-wire system (single-phase two-wire, single-phase three-wire, and three-phase three-wire systems)
	-4	Universal three-phase four-wire system (single-phase two-wire, single-phase three-wire, three-phase three-wire, and three-phase four-wire systems)
	-5	Three-phase four-wire system (2.5 element) *1
Input voltage/ input current	1	Universal voltage input *2 (150 V, 300 V, 600 V) / 1 A
	2	Universal voltage input *2 (150 V, 300 V, 600 V) / 5 A
Additional input and output function	0	1 digital input
	1	1 digital input, 1 analog output
	2	1 digital input, 1 pulse output
	3	1 digital input, 1 analog output, 1 pulse output
Communication function	0	RS-485 communication
	3	RS-485 communication, Ethernet communication *3
Optional measuring function	0	None
	3	Demand measurement (1 demand alarm output)
Power supply	-6	100-240 V AC ±10% (50/60 Hz) or 130-300 V DC ±15%
Phase indication format	A	A, B, and C indications
	R	R, S, and T indications
	-0	Always 0

*1 Can be used only when the voltage is in a state of equilibrium.

*2 Set the voltage range (150 V, 300 V or 600 V) according to the rated input voltage to be measured.

Rated input voltage	**Voltage range**	Allowable input voltage
120 V	**150 V**	150 V
240 V	**300 V**	300 V
480 V	**600 V**	600 V

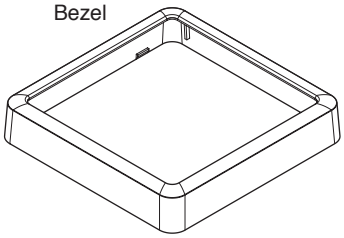
*3 For Ethernet communication, the RS-485 communication interface is exclusively for the Ethernet-serial gateway function.

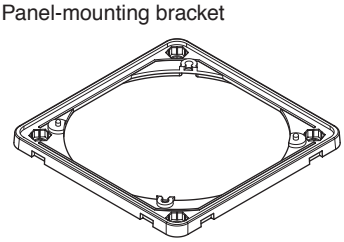
Serial Number (NO.)

Also inform this number (shown in “NO.” on the nameplate) when contacting the vendor from which you purchased the PR300.

■Checking the Accessories

(1) JIS/ANSI-mounting kit





Panel-mounting bolts (2)

Bracket-fixing screws (2)

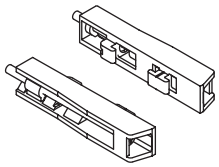
Nuts (2)

Flat washers (2)

Spring washers (2)

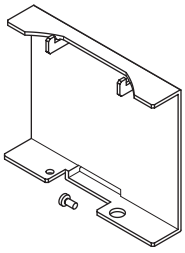
(2) DIN-mounting brackets

(for DIN 96-square instrument panel mounting)



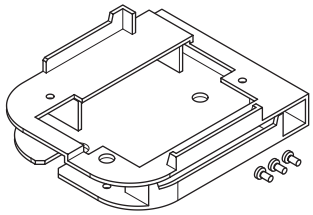
(3) Dust cover

(with 1 fixing screw)



(4) Terminal cover

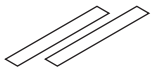
(with 3 fixing screws)



(5) Shorting bar

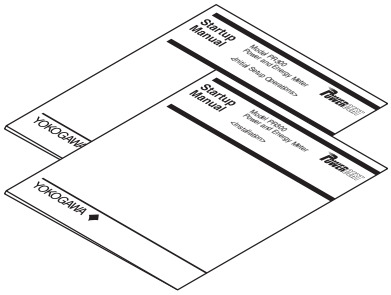
(for RS-485 communication termination)

(6) Tag number labels

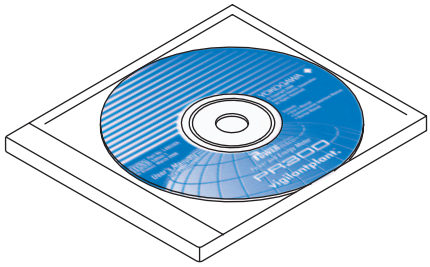


(7) Startup Manuals

(Installation/Initial Setup Operations)



(8) Manuals for the PR300 (CD)



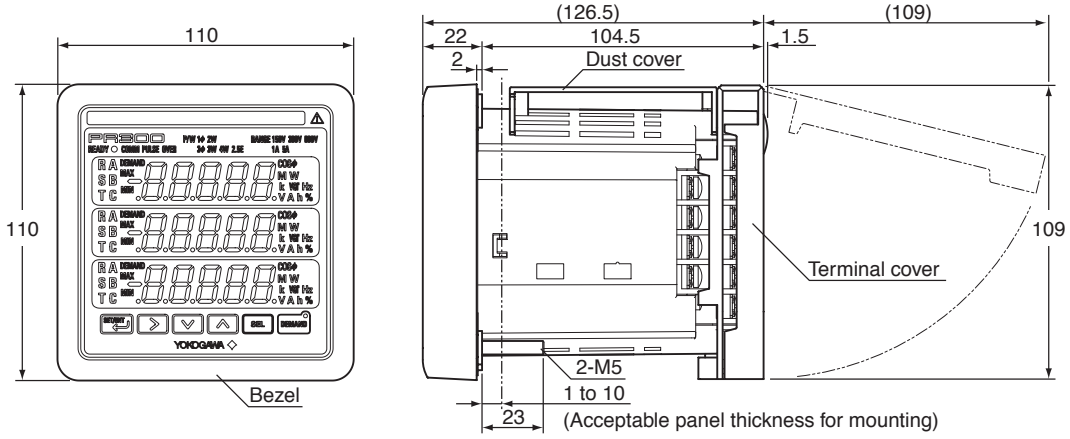
Item Name		Qty	Part Number	Remarks
(1) JIS/ANSI-mounting kit	Bezel	1	L4053AD	Used to mount the PR300 according to the ANSI 4-inch round form size or JIS110-square instrument size.
	Panel-mounting bracket	1	L4053AE	
	Panel-mounting bolts	2	B1015BB	
	Bracket-fixing screws	2	B1025BS	
	Flat washers	2	Y9500WS	
	Spring washers	2	Y9500SS	
	Nuts	2	Y9501BS	
(2) DIN-mounting brackets		2	L4053BM	Used to mount the PR300 according to the DIN 96-square instrument size.
(3) Dust cover		1	L4053AQ	Attached onto the top of the PR300 main unit.
	Fixing screw	1	B1025BS	
(4) Terminal cover		1	L4053AP	Attached to the PR300 terminal section. (Must always be attached to avoid a possible electric shock.)
	Fixing screws	3	B1025BS	
(5) Shorting bar		1	—	Used in RS-485 communication if the PR300 is a terminal device.
(6) Tag number label		2	—	
(7) Startup manual		2	—	A quick reference manual for use in initial installation.
(8) Manuals for the PR300(CD)		1	—	This CD contains all manuals related to the PR300.

1.1 Installation with the ANSI 4-inch Round Form or JIS 110-square Instrument Size

The PR300 can be installed so that it handles ANSI 4-inch round form or JIS 110-square instruments panel cutouts by attaching the “JIS/ANSI-mounting kit” accessory.

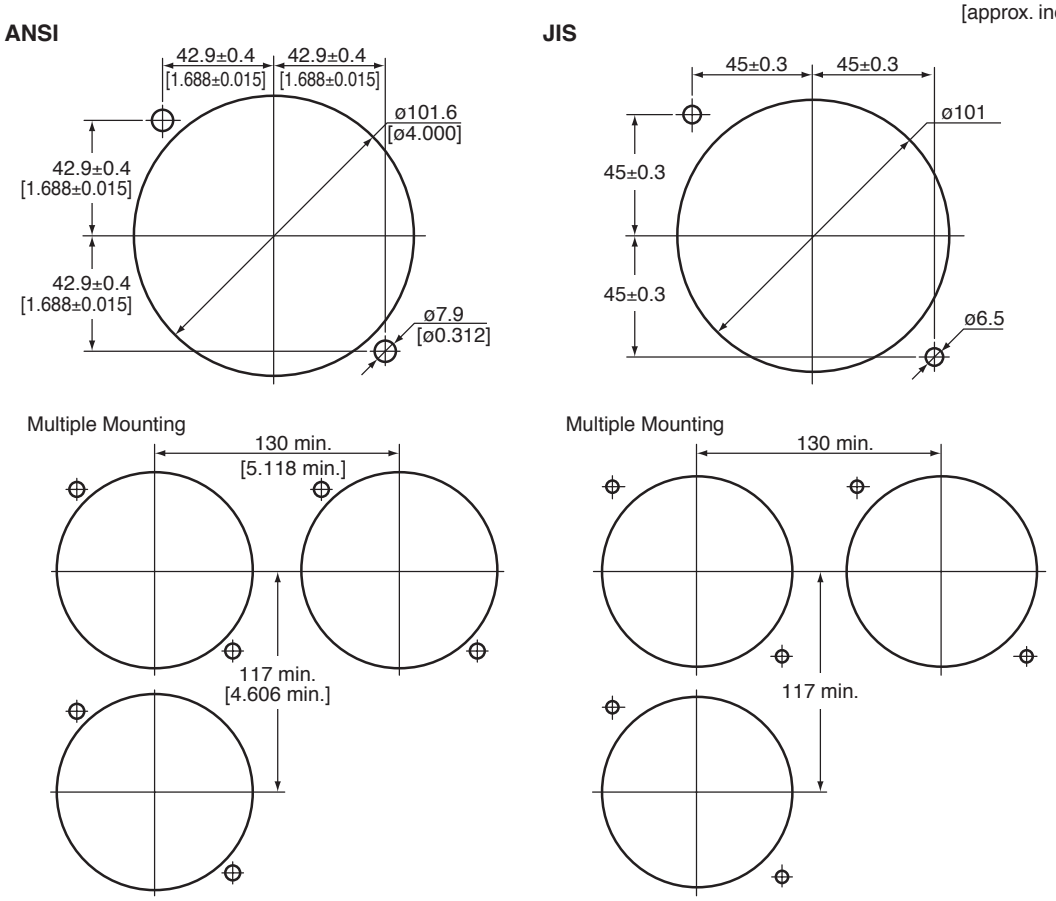
External Dimensions

Unit: mm



Panel Cutout Dimensions

Unit: mm
[approx. inch]



● Normal Allowable Deviation = ± (Value of JIS B 0401-1999 Tolerant Class IT18) / 2

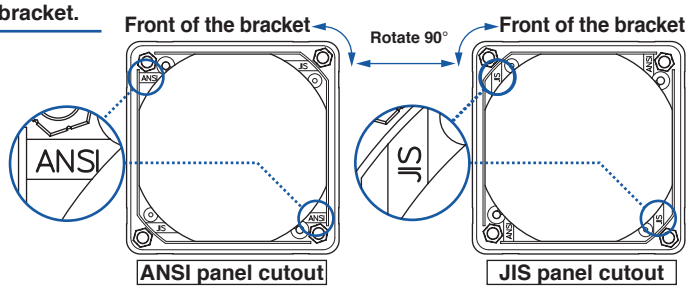
NOTE

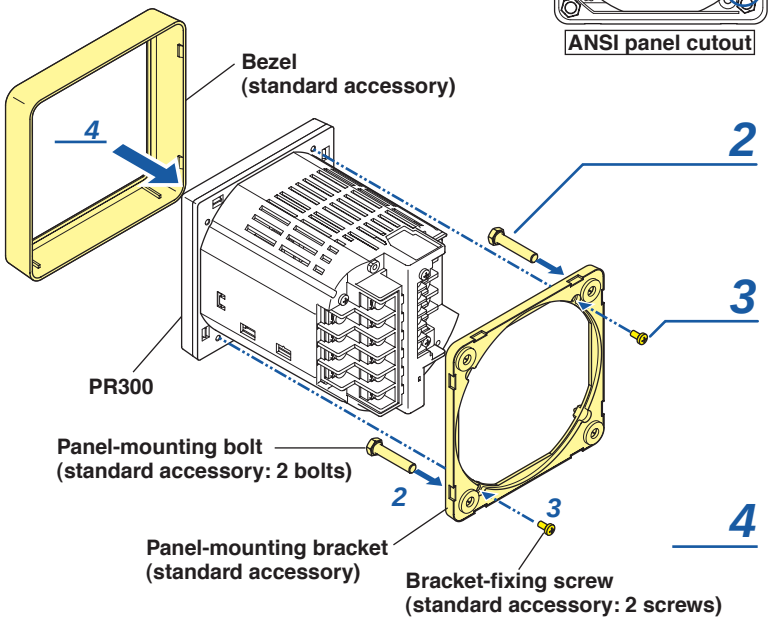
- **Do not install the PR300 in the following types of environments, as they may cause the PR300 to malfunction or fail. Avoid sites:**
  - **exposed to significant shock or vibration;**
  - **where large amounts of dust are present;**
  - **exposed to direct sunlight;**
  - **at altitudes above 2000 m.**
  - **where corrosive gases are present;**
  - **exposed to water;**
  - **outside;**
- **The PR300 mounting position is for vertical panels only.**

Mounting Method

1 Set the direction of the panel-mounting bracket.

The diagram on the right shows the front of the bracket (the side into which the panel-mounting bolt is inserted). Rotating the bracket 90° makes the bracket compatible with either ANSI or JIS panel cutouts. Set the bracket to either the ANSI or JIS mark according to which type of panel you are installing, as shown in the diagram on the right.

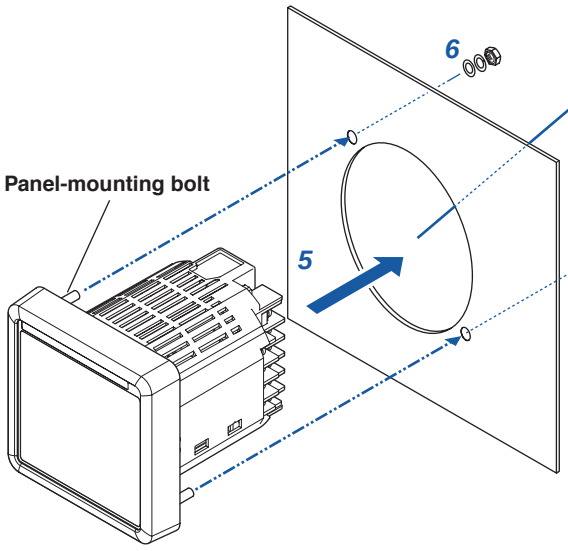




2 Insert two panel-mounting bolts into the front of the panel-mounting bracket as shown in the diagram on the left.

3 Fix the panel-mounting bracket securely to the back of the PR300 with two bracket-fixing screws as shown in the diagram on the left. (recommended tightening torque: 0.4 N·m)

4 Attach the bezel from the front of the PR300.



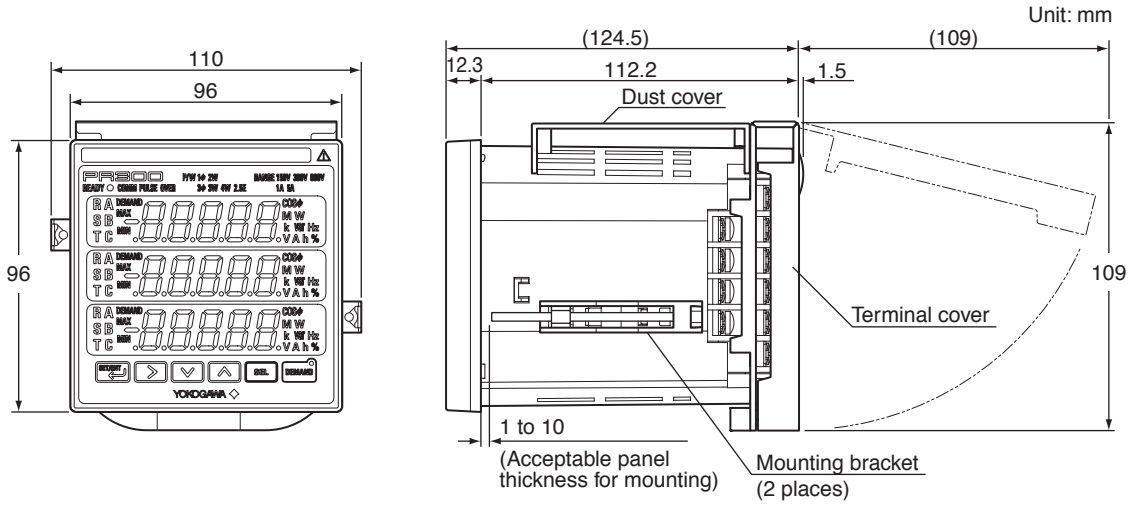
5 Insert the PR300 from its rear through the mounting cutout in the panel as shown in the diagram.

6 Secure the PR300's panel-mounting bolts by tightening them with the washers and nuts.

1.2 Installation with the DIN 96-square Instrument Size

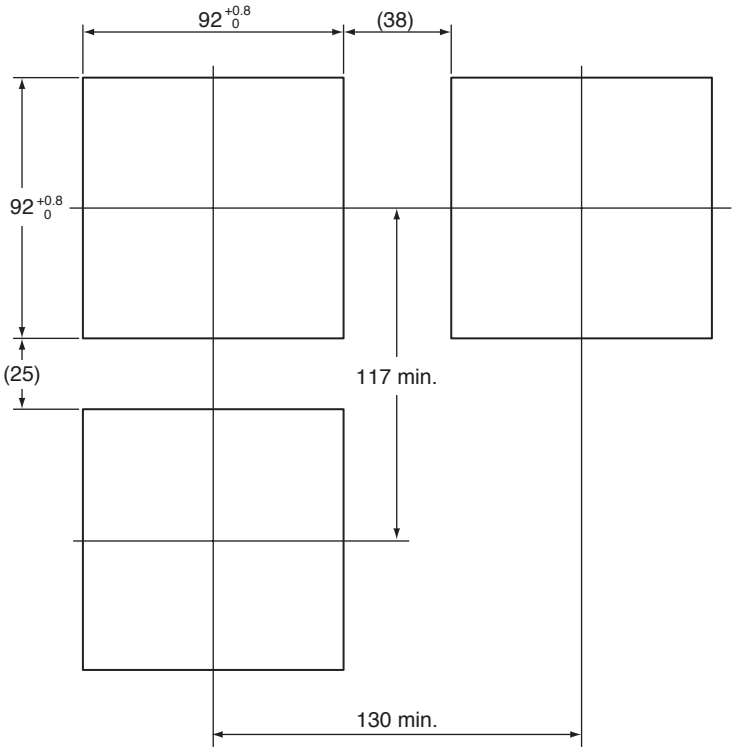
External Dimensions

Unit: mm



Panel Cutout Dimensions

Unit: mm

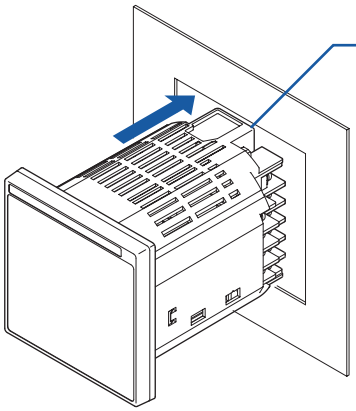


● Normal Allowable Deviation = ± (Value of JIS B 0401-1999 Tolerant Class IT18) / 2

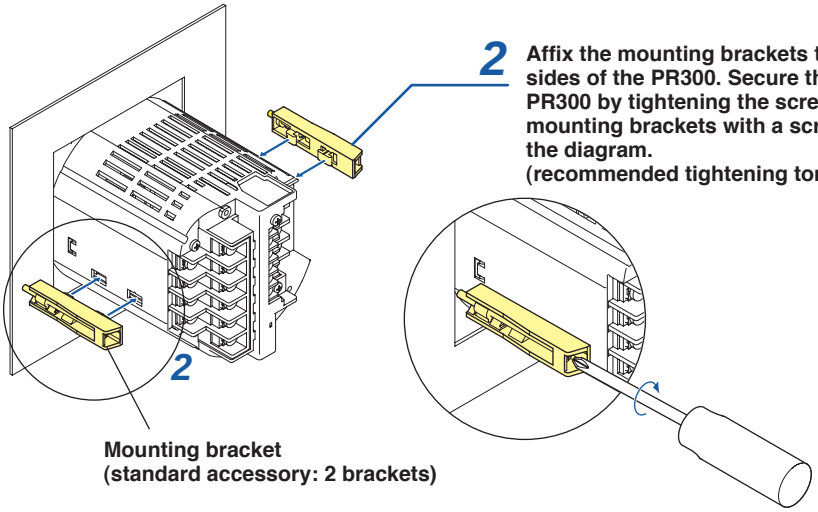
NOTE

- Do not install the PR300 in the following types of environments, as they may cause the PR300 to malfunction or fail. Avoid sites:
  - exposed to significant shock or vibration;
  - where large amounts of dust are present;
  - exposed to direct sunlight;
  - at altitudes above 2000 m.
  - where corrosive gases are present;
  - exposed to water;
  - outside;
- The PR300 mounting position is for vertical panels only.

Mounting Method



1 Insert the PR300 from its rear through the mounting cutout in the panel as shown in the diagram.



2 Affix the mounting brackets to the left and right sides of the PR300. Secure the brackets to the PR300 by tightening the screws in the end of the mounting brackets with a screwdriver as shown in the diagram.
(recommended tightening torque: 0.4 N·m)

Mounting bracket
(standard accessory: 2 brackets)

1.3 Wiring

CAUTION

- **As there is a danger of electric shock, turn off the power supply and check that the cables to be connected are not conducting electricity before carrying out the wiring procedure.**
- **For safety, be sure to install a circuit breaker switch that conforms to IEC60947 near the PR300 so as to be operated easily, and clearly indicate that the device is used to de-energize the PR300.**
- **The wiring procedure for the PR300 should be carried out by a qualified person (an electrician etc.) with knowledge of electrical matters and who has actual experience.**
- **If the voltage is below 600 V AC, it is possible to connect the PR300 directly without using a voltage transformer (VT) and if the current is below 5 A AC, it is possible to do so without using a current transformer (CT). However, in order to use the PR300 safely, the use of a VT and CT is recommended.**
- **Check the following before turning on the power. Using the product beyond the stated specifications may cause it to heat up and burn out.**
  - **Check that the power supply voltage, input voltage, and input current values to be applied to the PR300 agree with its specifications.**
  - **Check that the external wiring is connected to the terminals in accordance with the specifications.**
- **Do not touch the screws in locations (a) to (f) shown in the wiring diagrams. They are an essential part of the structure of the PR300. Loosening or tightening them may result in a malfunction or failure of the PR300.**
- **Be sure to attach the terminal cover to prevent electric shock (refer to Section 1.4) .**

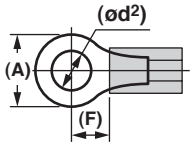
NOTE

- **When attaching the terminal cover**
  Since the terminal cover of PR300 has the structure to prevent electric shock, the terminal cover cannot be attached after completing all wiring. Refer to Section 1.4, "Attaching the Dust Cover and Terminal Cover" before wiring.
  (1) Attach the terminal cover after completing the wiring to the terminals 2, 4, 6, 8, 23, 24, and 25.
  (2) Execute the wiring to the terminals other than those mentioned above after attaching the terminal cover.
  If the dust cover is required, attach it before attaching the terminal cover.
- **Do not ground the input circuit when connecting voltage and current directly without using a VT and CT.**

Carry out the wiring referring to the diagrams on pages 1-6, 1-7, and 1-8. The wiring for voltage input, current input, and power supply is M4 screw terminal connection. For other wiring it is M3 screw terminal connection. The connector for connecting to the Ethernet is RJ45.
Use strand wires for the wiring. Wiring cables with a nominal cross-seactional area of 1.25 mm^2 or thicker are recommended for voltage/current input and power supply; cables with a nominal cross-seactional area of 0.5 mm^2 or thicker are recommended for other signals.

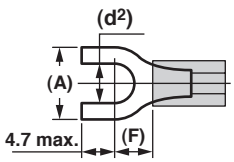
Crimping Terminal Recommendations

Ring tongue terminal

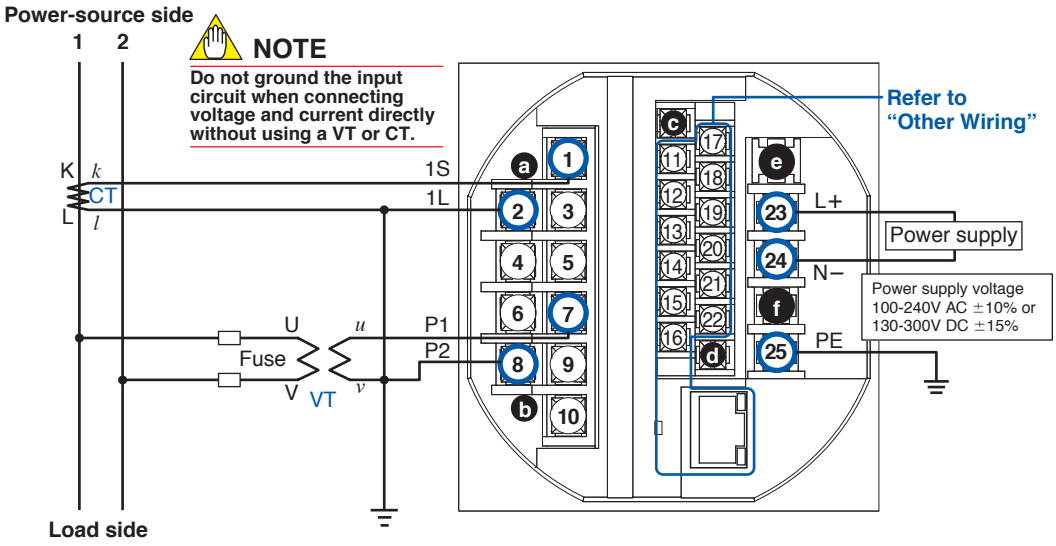


Applicable terminals	ød2 (mm)	A (mm)	F (mm)	Recommended tghtening torque	Applicable wire size
M4	4.4 max.	7.0 max.	7.8 max.	1.2 N•m	1.04 to 2.63 mm^2
M3	3.3 max.	5.8 max.	6.7 max.	0.6 N•m	0.25 to 1.65 mm^2

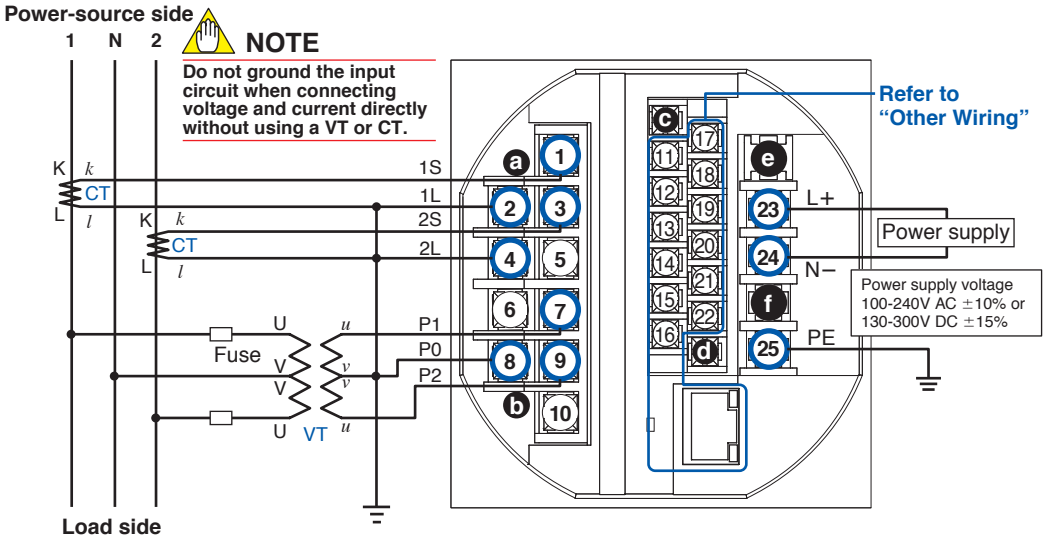
Spade tongue terminal



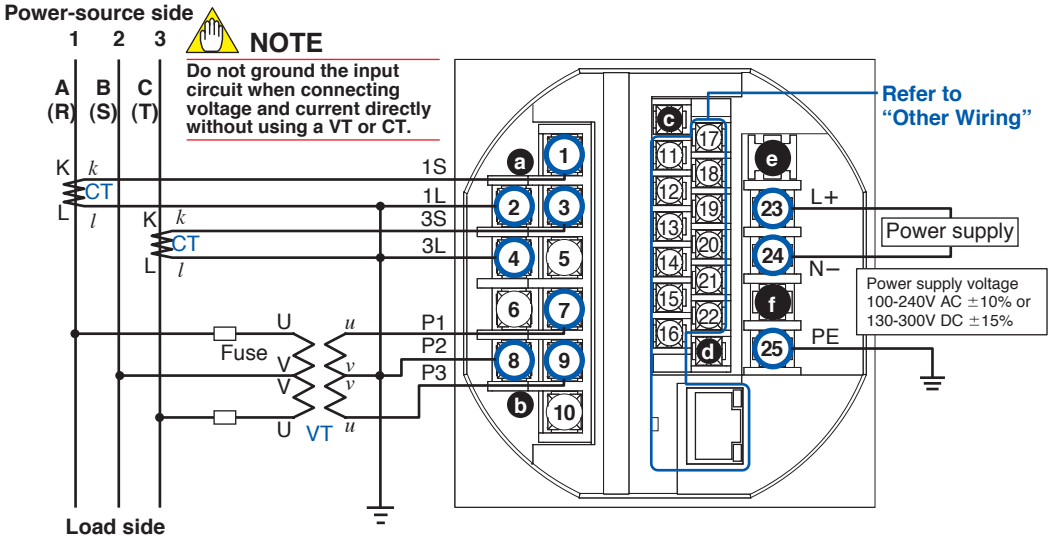
Single-phase two-wire system (voltage input, current input, power supply)



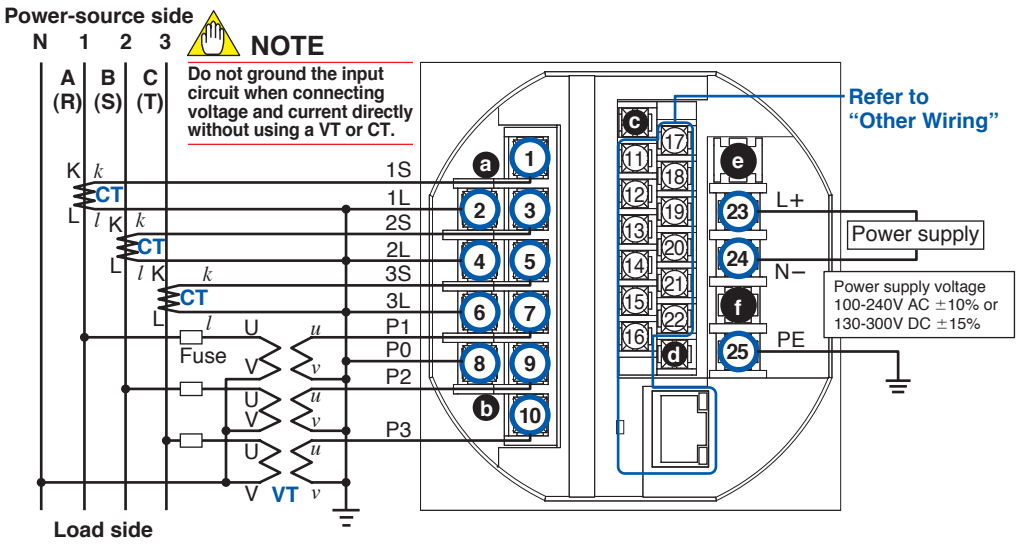
Single-phase three-wire system (voltage input, current input, power supply)



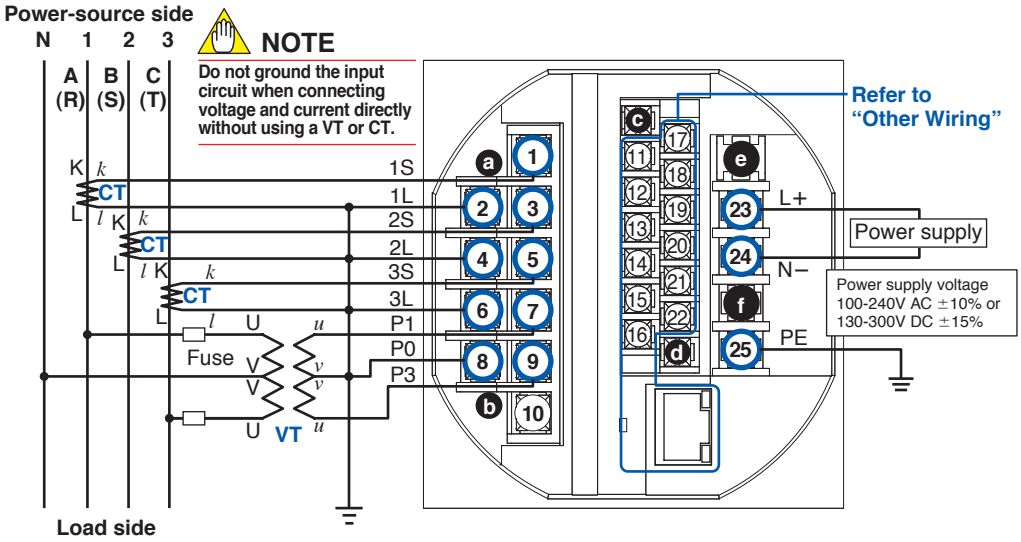
Three-phase three-wire system (voltage input, current input, power supply)



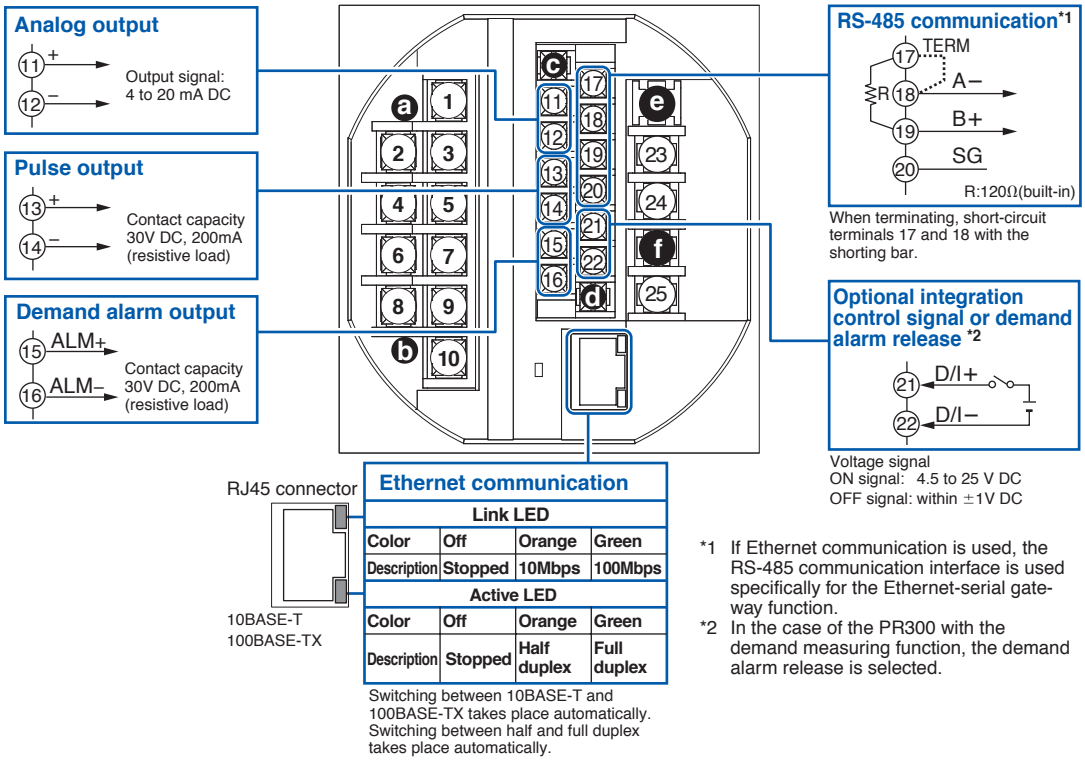
Three-phase four-wire system (voltage input, current input, power supply)



Three-phase four-wire system (2.5 element) (voltage input, current input, power supply)



Other Wiring



*1 If Ethernet communication is used, the RS-485 communication interface is used specifically for the Ethernet-serial gateway function.

*2 In the case of the PR300 with the demand measuring function, the demand alarm release is selected.

1.4 Attaching the Dust Cover and Terminal Cover

CAUTION

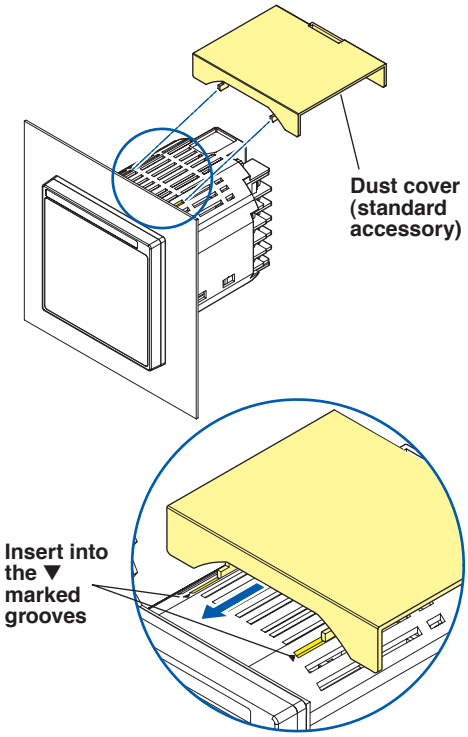
As there is a danger of electric shock, do not attach the dust cover and terminal cover while the wires are live.

NOTE

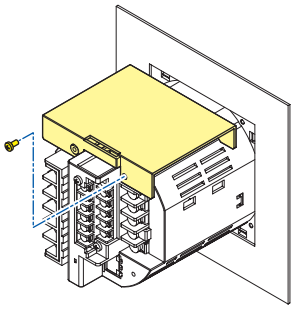
- **Attach the dust cover before attaching the terminal cover.**
- **The recommended tightening torque for the screws for attaching the dust cover and terminal cover is 0.4N·m.**

Attaching the Dust Cover

1 Insert the two protruding portions on the underside of the dust cover into the grooves on the upper side of the PR300 as shown in the diagram below.

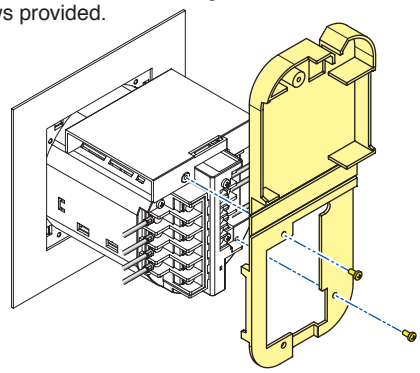


2 Secure the dust cover with the screw provided as shown in the diagram below.

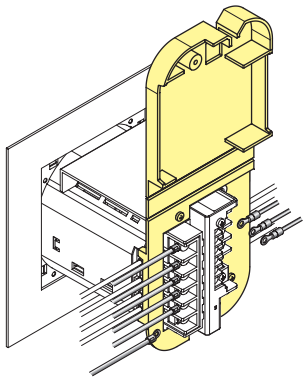


Attaching the Terminal Cover

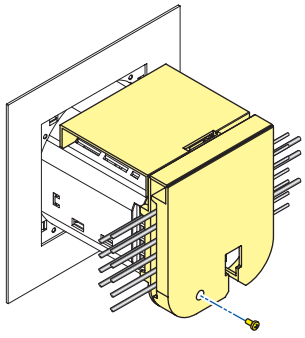
1 Complete the wiring to the terminals 2, 4, 6, 8, 23, 24 and 25, then secure the terminal cover in the open state shown in the diagram below with the two screws provided.



2 Complete the wiring to other terminals in the open state shown in the diagram below.



3 Close the terminal cover and secure it with the screw provided as shown in the diagram below.



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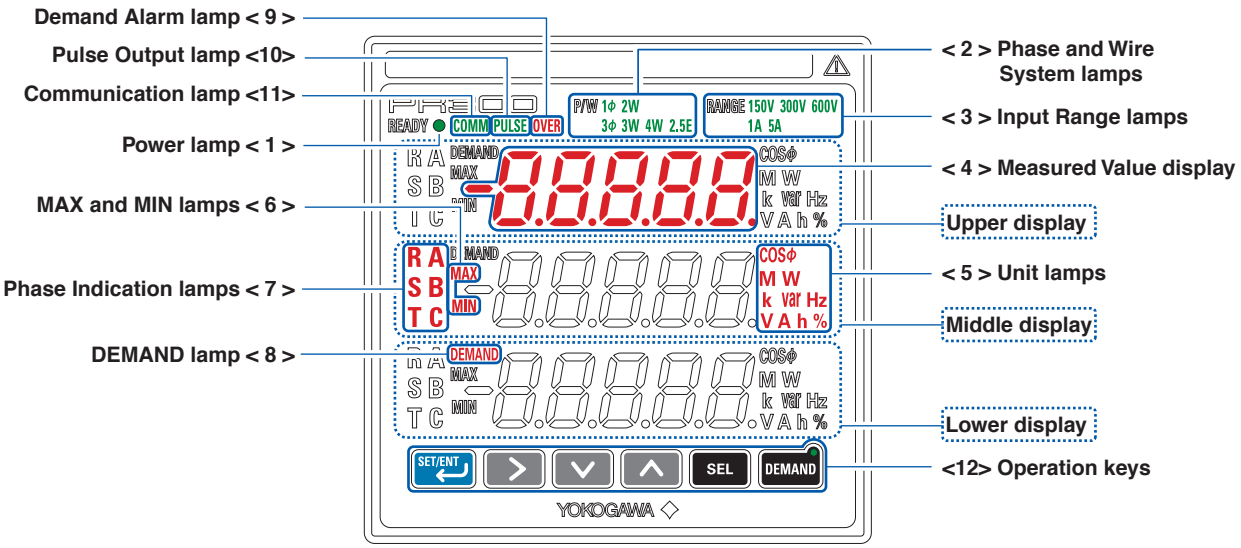
2.1 Component Names and Functions



Name	Display Color	Description
<1> Power lamp	Green	Comes on and remains lit when the PR300 is turned on and operating normally. Blinks (4 times/second) if a communication error occurs, and continues to blink until the PR300 returns to normal.
<2> Phase and Wire System lamps	Green	The phase and wire system option set in the PR300 turns on.
<3> Input Range lamps	Green	The voltage range option set in the PR300 and the current range (rated input) option specified at the time of ordering turn on.
<4> Measured Value display	Red	Shows a measured value of power, energy, etc. Also shows a parameter symbol and its setpoint at the time of parameter setting.
<5> Unit lamps	Red	Show the unit symbol of a measured value for each measurement item. These unit symbols are shown in combination depending on the type of measured value.
<6> MAX and MIN lamps	Red	Come on when the maximum or minimum measured value is displayed.
<7> Phase Indication lamps	Red	Come on to tell for which phase the voltage or current value is being measured.
<8> DEMAND lamp	Red	Comes on when the measured value of demand power or demand current is displayed. (Only supported for a PR300 with the demand measuring function.)
<9> Demand Alarm lamp	Red	Comes on if the demand value exceeds the demand alarm point at any point in time other than the demand alarm mask time.
<10> Pulse Output lamp	Green	Comes on when the output is turned on in the pulse output mode and goes out when the output is turned off.
<11> Communication lamp	Green	Blinks while RS-485 or Ethernet communication is in progress.
<12> Operation keys	SET/ENT	In the measured value display mode, this key is used, for example, to switch the display pattern. Also used to set parameters on the Parameter screen.
	>	In the measured value display mode, this key is used, for example, to move from one digit to another in an energy reading. Also used to set parameters on the Parameter screen.
	< >	In the measured value display mode, this key is used, for example, to show the maximum/minimum value. Also used to set parameters on the Parameter screen.
	SEL	In the measured value display mode, this key is used, for example, to switch the phase of voltage/current. Also used to set parameters on the Parameter screen.
	DEMAND	Use to start or stop demand measurement. The lamp (green) in the key lights in the demand measurement.

2.2 Setting the Phase and Wire System

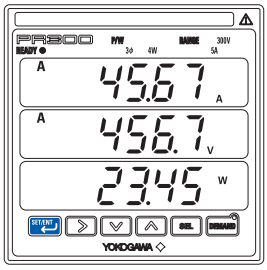
This section explains how to set the phase and wire system by taking as an example the case when a three-phase four-wire system is changed to a three-phase three-wire system.

Operation

Startup screen

1 Turn on the PR300.

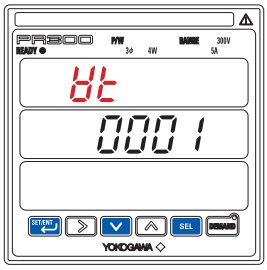
Measured Value screen



The PR300 shows the station number for about 5 seconds, then the Measured Value screen appears.

2 Hold down SET/ENT for at least 3 seconds.

VT Ratio screen



The parameter Ht (VT ratio) appears.

3 Simultaneously hold down SET/ENT, ▽ and SEL for at least 3 seconds.

Specification Change Confirmation screen

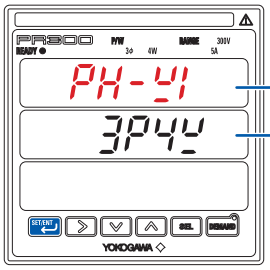
The Specification Change Confirmation screen appears.

4 Using ▽ or △, show YES on the lower display.

Specification Change Confirmation screen

5 Press SET/ENT once.

Phase and Wire System screen



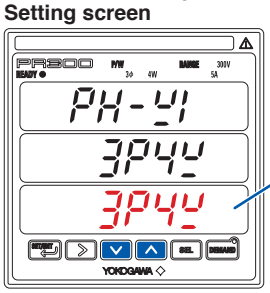
The Phase and Wire System screen appears.

Parameter symbol for phase and wire system

Current value

6 Press SET/ENT once.

Phase and Wire System Setting screen

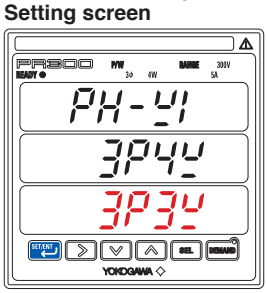


The Phase and Wire System Setting screen appears.

Setpoint

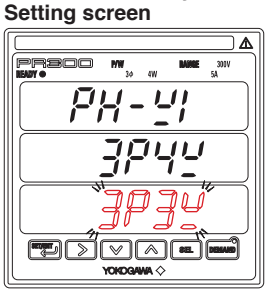
7 Switch the phase and wire system using ▽ or △.

Phase and Wire System Setting screen



8 Press SET/ENT twice to confirm the setpoint.

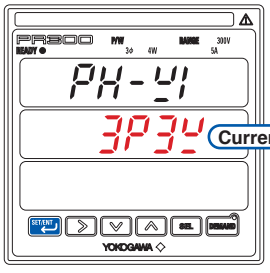
Phase and Wire System Setting screen



Pressing SET/ENT once causes all digits of the setpoint to start blinking. Pressing SET/ENT once again confirms the setpoint and returns to the Phase and Wire System screen.

The phase and wire system thus set is shown as the current value.

Phase and Wire System screen

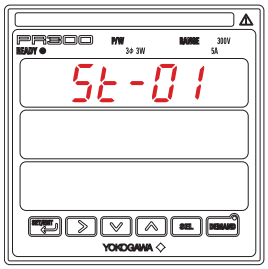


Current value

When proceeding to set the voltage range, start from Step 6 in Section 2.3, "Setting the Voltage Range," with this screen (figure on the left) shown

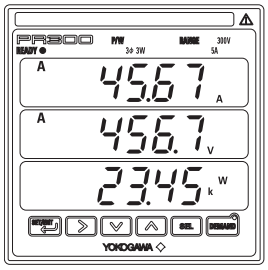
9 Hold down SET/ENT for at least 3 seconds.

Startup screen



The PR300 shows the Startup screen for about 5 seconds, then the Measured Value screen appears.

Measured Value screen



Setting completed.

NOTE

If you change the phase and wire system, all parameters other than those related to RS-485 and Ethernet communications are initialized (to factory-set values). Change the phase and wire system before setting parameters such as the VT and CT ratios.

Range of Phase and Wire System Options

Parameter Symbol	Parameter Name	Setting Type	Model and Suffix Codes	Setting Range (Details)	Initial Value (Factory-set Value)
PH-Y1	Phase and wire system	Selection	PR300-3□□□□-6□-0	Single-phase two-wire system 1P2W	Three-phase three-wire system
				Single-phase three-wire system 1P3W	
				Three-phase three-wire system 3P3W	
			PR300-4□□□□-6□-0	Single-phase two-wire system 1P2W	Three-phase four-wire system
				Single-phase three-wire system 1P3W	
				Three-phase three-wire system 3P3W	
				Three-phase four-wire system 3P4W	
			PR300-5□□□□-6□-0	Three-phase four-wire system (2.5 element) 2.5E	Three-phase four-wire system (2.5 element)

NOTE

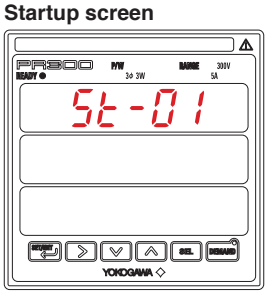
- **If single-phase three-wire system is selected, the voltage range is fixed at 300 V (between P0 and P1, P0 and P2). The voltage range cannot be selected.**
- **Three-phase four-wire system (2.5 element) can be used only when the voltage is in a state of equilibrium. In addition, the phase and wire system cannot be changed.**

2.3 Setting the Voltage Range

This section explains how to set the voltage range by taking as an example the case when the voltage range is changed from 300 V to 600 V.

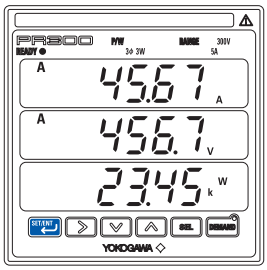
Operation

Startup screen



1 **Turn on the PR300.**

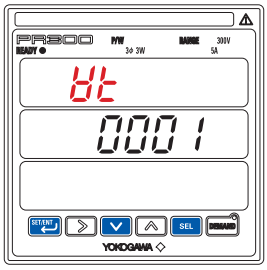
Measured Value screen



The PR300 shows the station number for about 5 seconds, then the Measured Value screen appears.

2 **Hold down SET/ENT for at least 3 seconds.**

VT Ratio screen



The parameter Vt (VT ratio) appears.

3 **Simultaneously hold down SET/ENT, and SEL for at least 3 seconds.**

Specification Change Confirmation screen

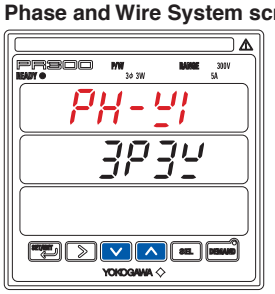
The Specification Change Confirmation screen appears.

4 **Using ▼ or ▲, show YES on the lower display.**

Specification Change Confirmation screen

5 **Press SET/ENT once.**

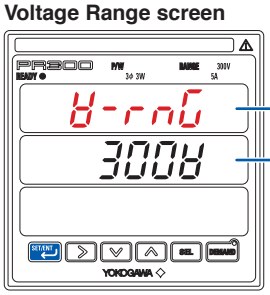
Phase and Wire System screen



The Phase and Wire System screen appears.

6 **Using ▼ or ▲, show the Voltage Range screen.**

Voltage Range screen



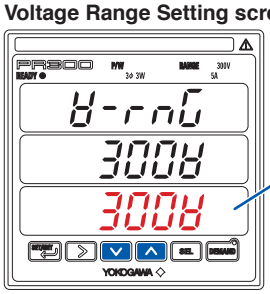
The Voltage Range screen appears.

Parameter symbol for voltage range

Current value

7 **Press SET/ENT once.**

Voltage Range Setting screen

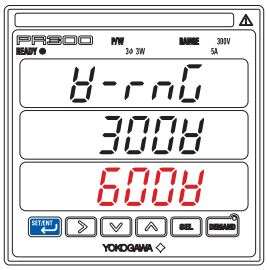


The Voltage Range Setting screen appears.

Setpoint

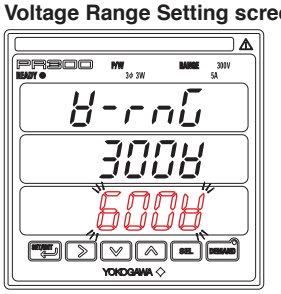
8 **Using ▼ or ▲, change the voltage range.**

Voltage Range Setting screen



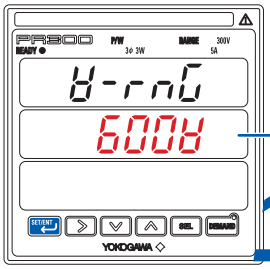
9 **Press SET/ENT twice to confirm the setpoint.**

Voltage Range Setting screen



Pressing SET/ENT once causes all digits of the setpoint to start blinking. Pressing SET/ENT once again confirms the setpoint and returns to the Voltage Range screen.

Voltage Range screen



The voltage range thus set is shown as the current value.

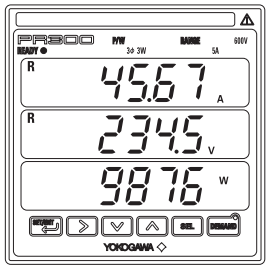
10 Hold down SET/ENT for at least 3 seconds.

When proceeding to set the phase and wire system, press ▽ or △ to show the Phase and Wire System screen, with this screen (figure in the upper-left corner) shown as is. After showing the Phase and Wire System screen, start from step *6* in Section 2.2, "Setting the Phase and Wire System."

Startup screen

The PR300 shows the Startup screen for about 5 seconds, then the Measured Value screen appears.

Measured Value screen



Setting completed.

NOTE

If you change the voltage range, all parameters other than those related to RS-485 and Ethernet communications are initialized (to factory-set values).Change the voltage range before setting parameters such as the VT and CT ratios.

Range of Voltage Range Options

Parameter Symbol	Parameter Name	Setting Type	Setting Range (Details)		Initial Value (Factory-set Value)
U-rnG	Voltage range	Selection	150V	150U	300V
			300V	300U	
			600V	600U	

NOTE

- **The voltage range of single-phase three-wire system is fixed at 300V (between P0 and P1, P0 and P2). The voltage range cannot be selected.**
- **For the voltage range of three-phase four-wire system, set the voltage between P0 and P1, P0 and P2, P0 and P3.**

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3.1 Basic Parameter Setting Operations

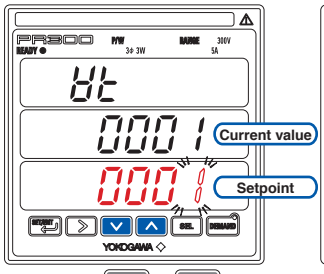
NOTE

Set parameters only after setting the phase and wire system and the voltage range. If you change the phase and wire system or voltage range after setting a parameter, the parameter will be initialized (to a factory-set value). Parameters related to RS-485 and Ethernet communications will not be initialized, however.

Methods of Changing Parameter Setpoints

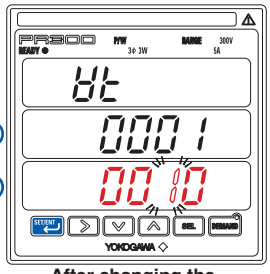
Four setting types - integral numeric value, fixed-point numeric value, floating-point numeric value, and selection - have been defined for the parameters of the PR300. For each setting type, the following explains basic operations used to set parameters.

Integral numeric value or fixed-point numeric value



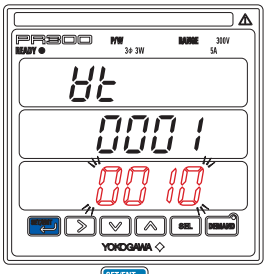
1 Using [▽] or [△], change the numeric value.

To move to the digit to be changed, use the following keys:
[◁] To the left
[▷] To the right



2 After changing the numeric value, press [SET/ENT] once.

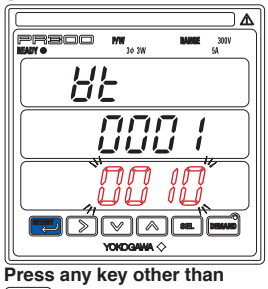
This causes all digits of the setpoint to start blinking.



3 Press [SET/ENT] while all digits of the setpoint are blinking.

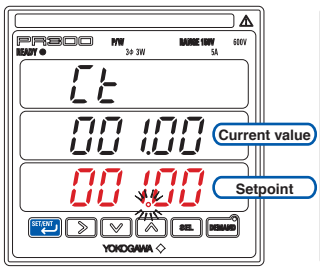
This confirms the setpoint.

To re-set the parameter:



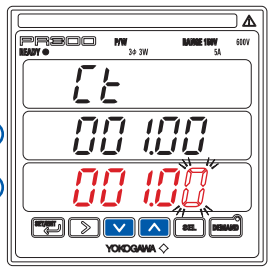
Press any key other than [SET/ENT] while all digits of the setpoint are blinking. The PR300 returns to the screen in step *1*.

Floating-point numeric value



1 Using [SET/ENT], confirm the number of decimal places.

To move the decimal point, use the following keys:
[◁] To the left
[▷] To the right

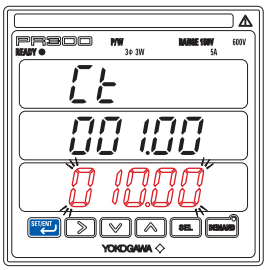


2 Using [▽] or [△], change the numeric value.

To move to the digit to be changed, use the following keys:
[◁] To the left
[▷] To the right

3 After changing the numeric value, press [SET/ENT] once.

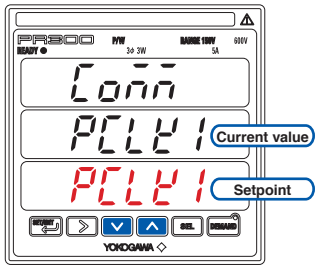
This causes all digits of the setpoint to start blinking.



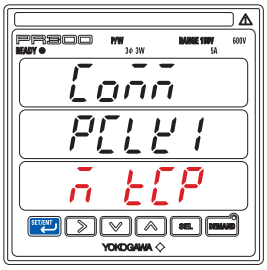
4 Press [SET/ENT] while all digits of the setpoint are blinking.

This confirms the setpoint.

Selection

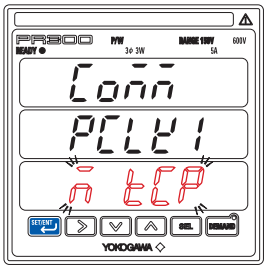


1 Change the setpoint using [▽] or [△].



2 After changing the numeric value, press [SET/ENT] once.

This causes all digits of the setpoint to start blinking.



3 Press [SET/ENT] while all digits of the setpoint are blinking.

This confirms the setpoint.

Key operations used to set parameters

[SET/ENT]	Moves from the Measured Value screen to the Parameter screen (hold down the key), or confirms the setpoint.
[▷]	Shows a parameter from the menu, moves through the digits of a setpoint (numeric value) to the right, or moves the decimal point to the right.
[▽]	Shows the next parameter or menu item, or changes the setpoint.
[△]	Shows the previous parameter or menu item, or changes the setpoint.
[SEL]	Returns from the Parameter screen to the Menu screen, moves through the digits of a setpoint (numeric value) to the left, or moves the decimal point to the left.

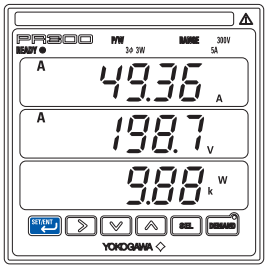
3.2 Setting the VT and CT Ratios

Setting the VT Ratio

This section explains how to set the VT ratio by taking as an example the case when the VT ratio is changed from the initial value (1) to 4.

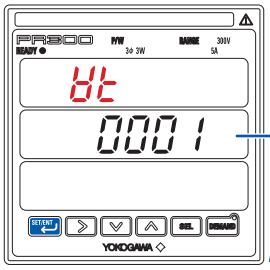
Operation

Measured Value screen



1 Hold down SET/ENT for at least 3 seconds.

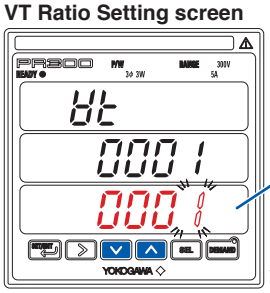
VT Ratio screen



The parameter VT (VT ratio) appears.

2 Press SET/ENT once.

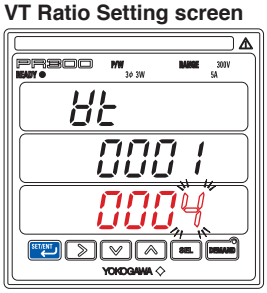
VT Ratio Setting screen



The screen changes to the one for setting the parameter VT and the alterable digit blinks.

3 Using ▽ or △, change the setpoint.

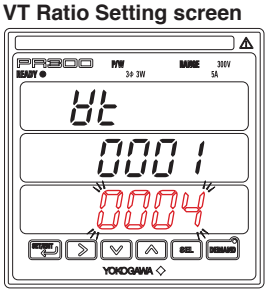
VT Ratio Setting screen



To move to the digit to be changed, use the following keys:
- SEL To the left
- ▷ To the right

4 Press SET/ENT twice to confirm the setpoint.

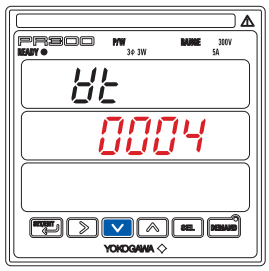
VT Ratio Setting screen



Pressing SET/ENT once causes all digits of the setpoint to start blinking. Pressing SET/ENT once again confirms the setpoint and returns to the VT Ratio screen.

To re-set the parameter:
Press any key other than SET/ENT while all digits of the setpoint are blinking.
The PR300 returns to the initial setting screen.

VT Ratio screen



To return to the Measured Value screen, hold down SET/ENT.

If you do not operate any key for more than 5 minutes on the Parameter screen, the PR300 automatically returns to the Measured Value screen.

Setting completed.

When proceeding to set the CT ratio, press ▽ once and start from step *3* in "Setting the CT Ratio."

Parameter Setting Types and Ranges

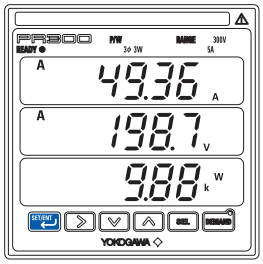
Parameter Symbol	Parameter Name	Setting Type	Setting Range (Details)	Initial value (Factory-set Value)
VT	VT ratio	Integral numeric value	1 to 6000	1

Setting the CT Ratio

This section explains how to set the CT ratio by taking as an example the case when the CT ratio is changed from the initial value (1.00) to 10.00.

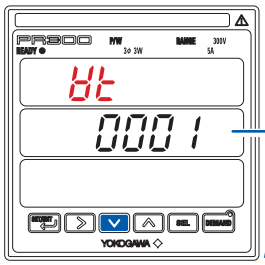
Operation

Measured Value screen



1 Hold down SET/ENT for at least 3 seconds.

VT Ratio screen

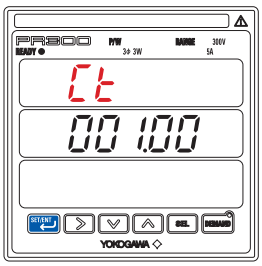


The parameter VT (VT ratio) appears.

Current value

2 Press ▽ once.

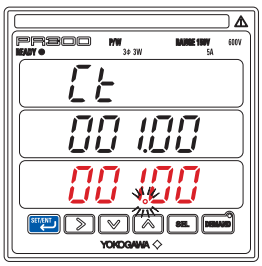
CT Ratio screen



The parameter CT (CT ratio) appears.

3 Press SET/ENT once.

CT Ratio Setting screen

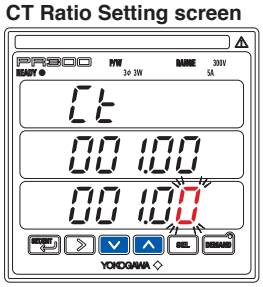


The screen changes to the one for setting the parameter CT and the decimal point blinks.

To move the decimal point, use the following keys:
- SEL To the left
- ▷ To the right

4 Press SET/ENT once to fix the position of the decimal point.

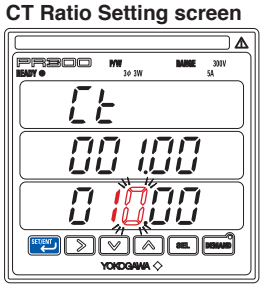
CT Ratio Setting screen



The alterable digit blinks.

5 Using ▽ or △, change the setpoint.

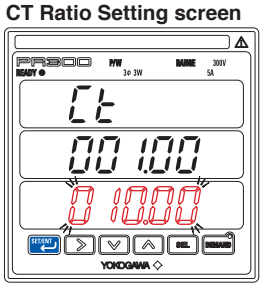
CT Ratio Setting screen



To move to the digit to be changed, use the following keys:
- SEL To the left
- ▷ To the right

6 Press SET/ENT twice to confirm the setpoint.

CT Ratio Setting screen



Pressing SET/ENT once causes all digits of the setpoint to start blinking. Pressing SET/ENT once again confirms the setpoint and returns to the CT Ratio screen.

To re-set the parameter:
Press any key other than SET/ENT while all digits of the setpoint are blinking.
The PR300 returns to the initial setting screen.

CT Ratio screen

To return to the Measured Value screen, hold down SET/ENT.

If you do not operate any key for more than 5 minutes on the Parameter screen, the PR300 automatically returns to the Measured Value screen.

Setting completed.

Parameter Setting Types and Ranges

Parameter Symbol	Parameter Name	Setting Type	Setting Range (Details)	Initial Value (Factory-set Value)
CT	CT ratio	Floating-point numeric value	0.05 to 32000	1.00

NOTE

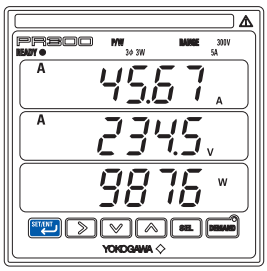
Set the VT and CT ratios so that the value of "secondary rated power × VT ratio × CT ratio" is smaller than 10 GW. If this value exceeds 10 GW, the updated VT or CT ratio will not be incorporated but revert to the current value before change.

3.3 Setting the Integrated Low-cut Power

This section explains how to set the integrated low-cut power by taking as an example the case when the setpoint is changed from the initial value (0.05%) to 0.1%.

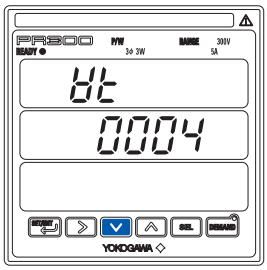
Operation

Measured Value screen



1 Hold down SET/ENT for at least 3 seconds.

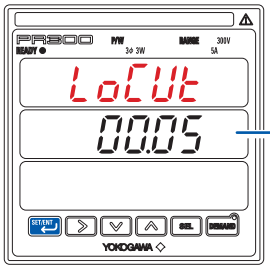
VT Ratio screen



The parameter VT (VT ratio) appears.

2 Press ▽ twice.

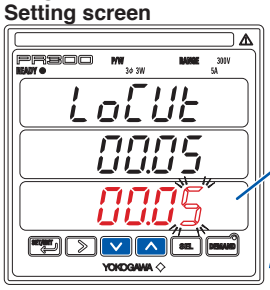
Integrated Low-cut Power screen



The parameter LoCUt (integrated low-cut power) appears.

3 Press SET/ENT once.

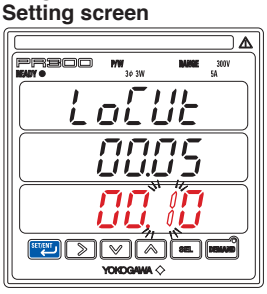
Integrated Low-cut Power Setting screen



The screen changes to the one for setting the parameter LoCUt and the alterable digit blinks.

4 Using ▽ or △, change the setpoint.

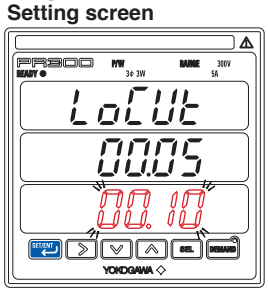
Integrated Low-cut Power Setting screen



To move to the digit to be changed, use the following keys:
- ◁ To the left
- ▷ To the right

5 Press SET/ENT twice to confirm the setpoint.

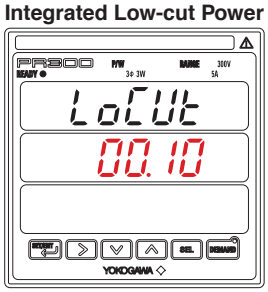
Integrated Low-cut Power Setting screen



Pressing SET/ENT once causes all digits of the setpoint to start blinking. Pressing SET/ENT once again confirms the setpoint and returns to the Integrated Low-cut Power screen.

To re-set the parameter:
Press any key other than SET/ENT while all digits of the setpoint are blinking.
The PR300 returns to the initial setting screen.

Integrated Low-cut Power screen



To return to the Measured Value screen, hold down SET/ENT.

If you do not operate any key for more than 5 minutes on the Parameter screen, the PR300 automatically returns to the Measured Value screen.

Setting completed.

Parameter Setting Types and Ranges

Parameter Symbol	Parameter Name	Setting Type	Setting Range (Details)	Initial Value (Factory-set Value)
LoCUt	Integrated low-cut power	Fixed-point numeric value	0.05 to 20.00 (%)	0.05

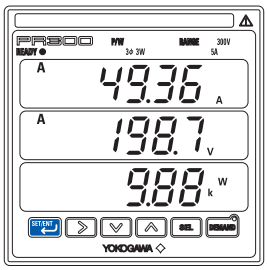
Integrated low-cut power
This parameter is used to prevent active power (regenerative power), reactive power (LEAD/LAG) and apparent power from being calculated as energy if they are smaller than the integrated low-cut power. Set this parameter as a percent (%) of the rated power.

3.4 Setting RS-485 Communication Conditions

This section explains how to set RS-485 communication conditions by taking as an example the case when the protocol is changed from the initial value to Modbus/RTU.

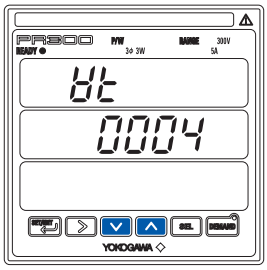
Operation

Measured Value screen



1 Hold down SET/ENT for at least 3 seconds.

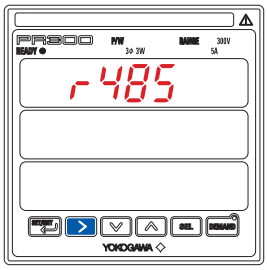
VT Ratio screen



The parameter Vt (VT ratio) appears.

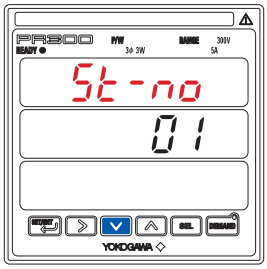
2 Using ∨ or ∧, show r485.

RS-485 Communication Menu screen



3 Press > once.

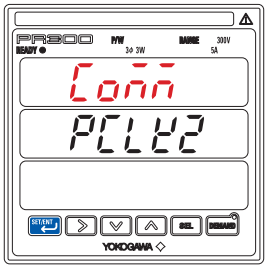
Station Number screen



The parameter St-no (station number) appears.

4 Press ∨ once.

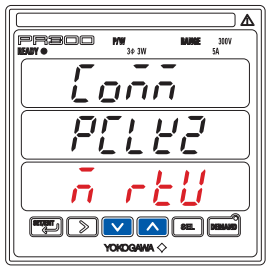
Protocol screen



The parameter Conn (protocol) appears.

5 Press SET/ENT once.

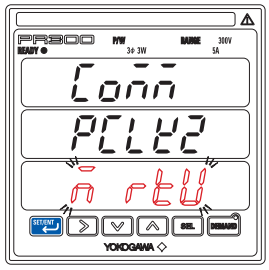
Protocol Setting screen



The screen changes to the one for setting the parameter Conn.

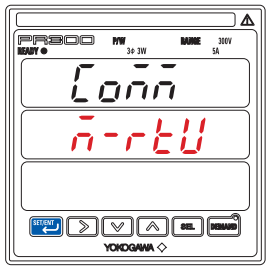
6 Using ∨ or ∧, change the setpoint.

Protocol Setting screen



7 Press SET/ENT twice to confirm the setpoint.

Protocol screen



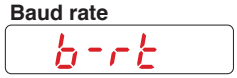
Pressing SET/ENT once causes all digits of the setpoint to start blinking. Pressing SET/ENT once again confirms the setpoint and returns to the Protocol screen.

To re-set the parameter:
Press any key other than SET/ENT while all digits of the setpoint are blinking.
The PR300 returns to the initial setting screen.

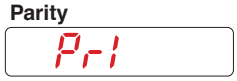
Setting completed.

Each press of ∨ cycles through the parameter options, as shown below.
Refer to "Parameter Setting Types and Ranges" on the next page to set other parameters in the same manner.

Baud rate

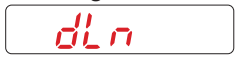


Parity



Stop bit

Data length



To return to the RS-485 Communication Menu screen, press SEL.

To return to the Measured Value screen, hold down SET/ENT.

If you do not operate any key for more than 5 minutes on the Parameter screen, the PR300 automatically returns to the Measured Value screen.

NOTE

- **The Modbus/TCP protocol can only be selected for a PR300 with the Ethernet communication function.**
- **If the protocol is set to Modbus/TCP, the station number, baud rate, stop bit, and data length setpoints are fixed as shown below.**
  Station number = 01, Baud rate = 9600 bps, Stop bit = 1 bit, Data length = 8 bits

Parameter Setting Types and Ranges

Parameter Symbol	Parameter Name	Setting Type	Setting Range (Details)	Initial Value (Factory-set Value)
r485	RS-485 communication menu	———	Menu to shift to the parameters of RS-485 communication	———
St-no	Station number	Integral numeric value	1 to 99	1
Conn	Protocol	Selection	PC link without checksum: PCLK1 PC link with checksum: PCLK2 Modbus/ASCII: n ASC Modbus/RTU: n rtU Modbus/TCP (*1): n tCP	PC link with checksum
b-rt	Baud rate	Selection	2400 bps: 2400 9600 bps: 9600 19200 bps: 19200	9600 bps
Pri	Parity	Selection	NONE: nonE EVEN: EVEn ODD: odd	NONE
StP	Stop bit	Selection	1 bit: 1 2 bits: 2	1
dLn	Data length(*2)	Selection	8 bits: 8 7 bits: 7	8

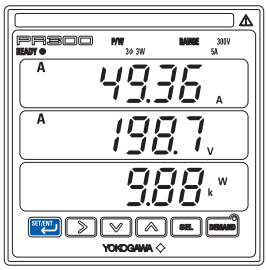
*1 Can only be selected for a PR300 with the Ethernet communication function.
*2 Select “8” if you have selected Modbus/RTU for the protocol option.

3.5 Setting Ethernet Communication Conditions

This section explains how to set Ethernet communication conditions by taking as an example the case when the IP address is changed from the initial value to “192.168.1.2”.

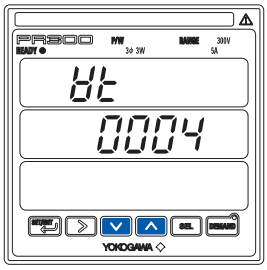
Operation

Measured Value screen



1 Hold down SET/ENT for at least 3 seconds.

VT Ratio screen



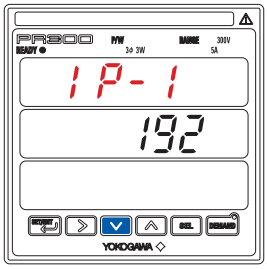
The parameter VT (VT ratio) appears.

2 Using ∨ or ∧, show Ethr.

Ethernet Communication Menu screen

3 Press > once.

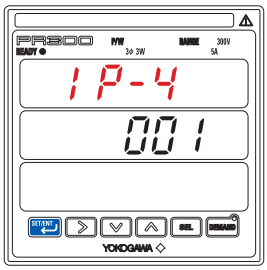
IP Address-1 screen



The parameter IP-1 (IP address-1) appears.

4 Press ∨ three times.

IP Address-4 screen



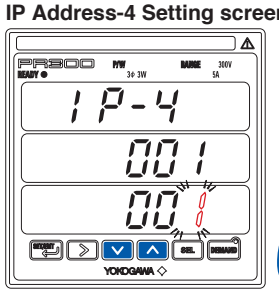
The parameter IP-4 (IP address-4) appears.

The parameter options change as shown below.

IP-2 ➡ IP-3 ➡ IP-4

5 Press SET/ENT once.

IP Address-4 Setting screen

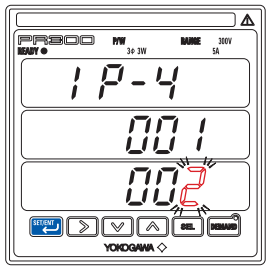


The screen changes to the one for setting the parameter IP-4

Parameter	IP-1	IP-2	IP-3	IP-4
IP address	192.	168.	1.	2

6 Using ∨ or ∧, change the setpoint.

IP Address-4 Setting screen



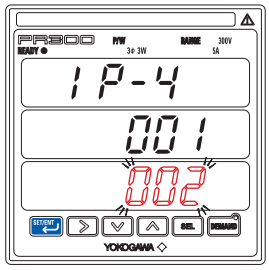
To move to the digit to be changed, use the following keys:

< To the left

> To the right

7 Press SET/ENT twice to confirm the setpoint.

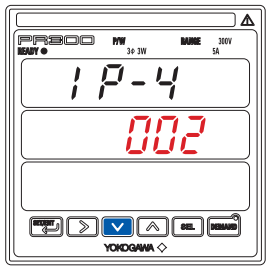
IP Address-4 Setting screen



Pressing SET/ENT once causes all digits of the setpoint to start blinking. Pressing SET/ENT once again confirms the setpoint and returns to the IP Address-4 screen.

To re-set the parameter:
Press any key other than SET/ENT while all digits of the setpoint are blinking.
The PR300 returns to the initial setting screen.

IP Address-4 screen

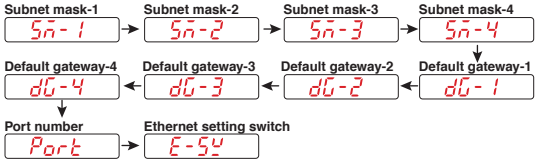


To enable the parameter setting, execute step *8* on the next page.

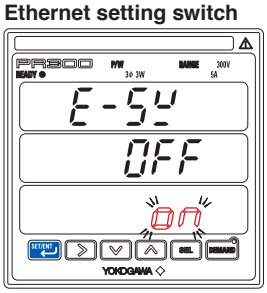
IP address setting completed.

Each press of ∨ cycles through the parameter options, as shown below.

Refer to “Parameter Setting Types and Ranges” on the next page to set other parameters in the same manner.



Ethernet setting switch

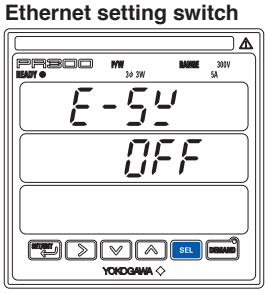


Set the Ethernet setting switch to ON to enable the new settings. When the settings have been updated, the switch is automatically set back to OFF.

8 Set the settings of parameter E-SY to ON and press SET/ENT twice.

The parameter settings have been updated.

Ethernet setting switch



To return to the Ethernet Communication Menu screen, press SEL.

To return to the Measured Value screen, hold down SET/ENT.

If you do not operate any key for more than 5 minutes on the Parameter screen, the PR300 automatically returns to the Measured Value screen.

NOTE

- When using Ethernet communication, set the RS-485 communication protocol to Modbus/TCP (see Section 3.4).
- To be able to update the Ethernet parameter settings, the Ethernet setting switch must be set to ON.

Parameter Setting Types and Ranges

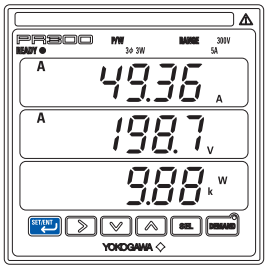
Parameter Symbol	Parameter Name	Setting Type	Setting Range (Details)	Initial Value (Factory-set Value)
Ethr	Ethernet communication menu	———	Menu to shift to the parameters of Ethernet communication	———
IP-1	IP address-1	Integral numeric value	0 to 255	192
IP-2	IP address-2		0 to 255	168
IP-3	IP address-3		0 to 255	1
IP-4	IP address-4		0 to 255	1
Sn-1	Subnet mask-1	Integral numeric value	0 to 255	255
Sn-2	Subnet mask-2		0 to 255	255
Sn-3	Subnet mask-3		0 to 255	255
Sn-4	Subnet mask-4		0 to 255	0
dG-1	Default gateway-1	Integral numeric value	0 to 255	0
dG-2	Default gateway-2		0 to 255	0
dG-3	Default gateway-3		0 to 255	0
dG-4	Default gateway-4		0 to 255	0
Port	Port number	Integral numeric value	502, 1024 to 65535	502
E-SY	Ethernet setting switch	Selection	ON (Enable the settings) on OFF oFF	OFF

3.6 Setting Pulse Output Conditions

This section explains how to set pulse output conditions by taking as an example the case when the ON pulse width is changed from the initial value to 100 ms.

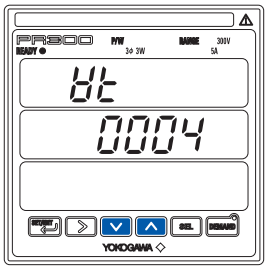
Operation

Measured Value screen



1 Hold down SET/ENT for at least 3 seconds.

VT Ratio screen



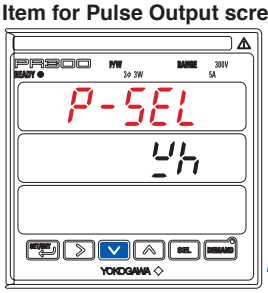
The parameter Ut (VT ratio) appears.

2 Using ▼ or ▲, show PULSE.

Pulse Output Menu screen

3 Press ▶ once.

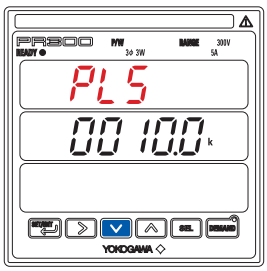
Measurement Item for Pulse Output screen



The parameter P-SEL (measurement item for pulse output) appears.

4 Press ▼ once.

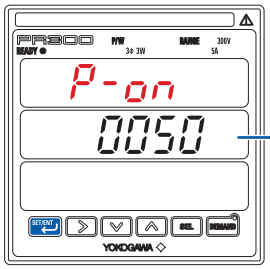
Pulse Unit screen



The parameter PLS (pulse unit) appears.

5 Press ▼ once.

ON Pulse Width screen

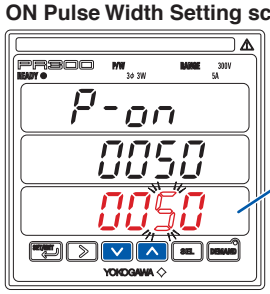


The parameter P-on (ON pulse width) appears.

Current value

6 Press SET/ENT once.

ON Pulse Width Setting screen

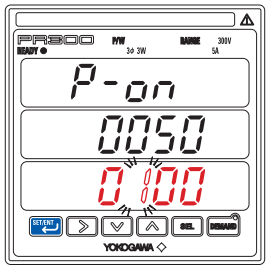


The screen changes to the one for setting the parameter P-on and the alterable digit blinks.

Setpoint

7 Using ▼ or ▲, change the setpoint.

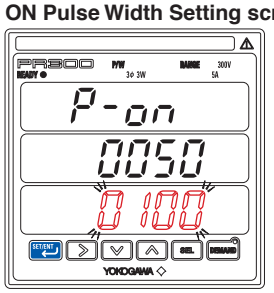
ON Pulse Width Setting screen



To move to the digit to be changed, use the following keys:
◀ To the left
▶ To the right

8 Press SET/ENT twice to confirm the setpoint.

ON Pulse Width Setting screen

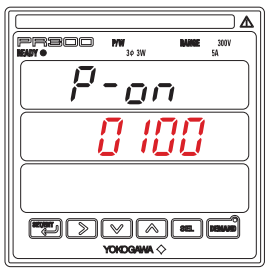


Pressing SET/ENT once causes all digits of the setpoint to start blinking. Pressing SET/ENT once again confirms the setpoint and returns to the ON Pulse Width screen.

To re-set the parameter:
Press any key other than SET/ENT while all digits of the setpoint are blinking.
The PR300 returns to the initial setting screen.

To return to the Pulse Output Menu screen, press SEL.

ON Pulse Width screen



To return to the Measured Value screen, hold down SET/ENT.

If you do not operate any key for more than 5 minutes on the Parameter screen, the PR300 automatically returns to the Measured Value screen.

Pulse width setting completed.

NOTE

If the pulse unit and ON pulse width do not satisfy the following conditional expression, the updated pulse unit setpoint or ON pulse width setpoint reverts to the value before change.

$$\text{ON pulse width [ms]} \leqq \frac{\text{Pulse unit [kWh]} \times 3600 \times 1000^2}{\text{Primary rated power} \times 1.2 \times 2}$$

Parameter Setting Types and Ranges

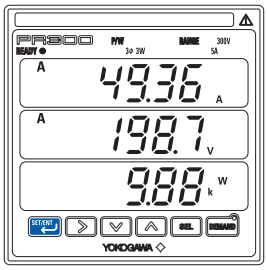
Parameter Symbol	Parameter Name	Setting Type	Setting Range (Details)	Initial Value (Factory-set Value)
PULSE	Pulse output menu	———	Menu to shift to the parameters of pulse output	———
P-SEL	Measurement item for pulse output	Selection	Active energy _Wh Regenerative energy -_Wh LEAD reactive energy -varh LAG reactive energy varh Apparent energy VAh	Active energy
PLS	Pulse unit	Fixed-point numeric value	0.1 to 5000.0 (k)	1.0
P-on	ON pulse width	Integral numeric value	10 to 1270 (ms)	50

3.7 Setting Analog Output Conditions

This section explains how to set analog output conditions by taking as an example the case when the measurement item for analog output is changed to the current-1 and lower limit of scaling to 0% from their respective initial values.

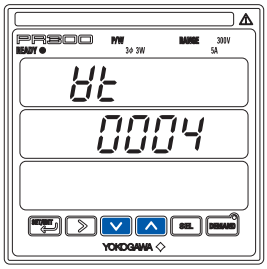
Operation

Measured Value screen



1 Hold down SET/ENT for at least 3 seconds.

VT Ratio screen



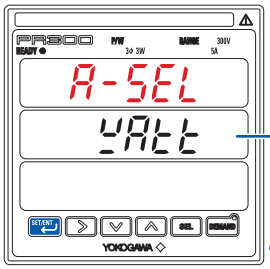
The parameter Vt (VT ratio) appears.

2 Using ∨ or ∧, show AnLoG.

Analog Output Menu screen

3 Press > once.

Measurement Item for Analog Output screen



The parameter A-SEL (measurement item for analog output) appears.

Current value

4 Press SET/ENT once.

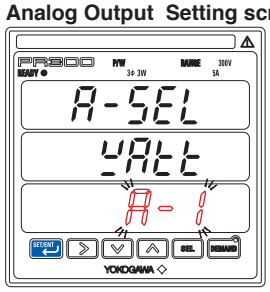
Measurement Item for Analog Output Setting screen

The screen changes to the one for setting the parameter A-SEL.

Setpoint

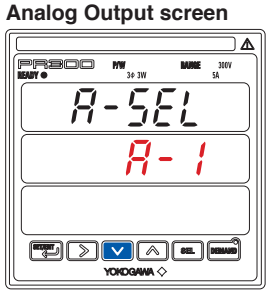
5 Using ∨ or ∧, change the setpoint.

Measurement Item for Analog Output Setting screen



6 Press SET/ENT twice to confirm the setpoint.

Measurement Item for Analog Output screen



Pressing SET/ENT once causes all digits of the setpoint to start blinking. Pressing SET/ENT once again confirms the setpoint and returns to the Measurement Item for Analog Output screen.

Measurement item for analog output setting completed.

7 Press ∨ once.

Lower Limit of Scaling screen

The parameter A-Lo (lower limit of scaling) appears.

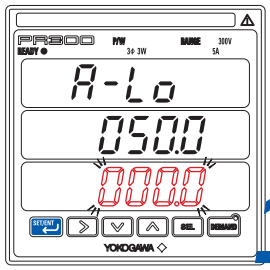
8 Press SET/ENT once.

Lower Limit of Scaling Setting screen

The screen changes to the one for setting the parameter A-Lo.

9 Using ∨ or ∧, change the setpoint.

Lower Limit of Scaling Setting screen



To move to the digit to be changed, use the following keys:
- < To the left
- > To the right

10 Press SET/ENT twice to confirm the setpoint.

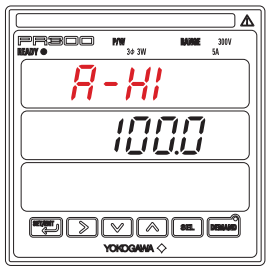
Lower Limit of Scaling screen

To re-set the parameter:
Press any key other than SET/ENT while all digits of the setpoint are blinking.
The PR300 returns to the initial setting screen.

To change the upper limit of scaling, set a new limit using the parameter A-HI that follows.

Lower limit of scaling setting completed.

Upper Limit of Scaling screen



To return to the Pulse Output Menu screen, press SEL.

To return to the Measured Value screen, hold down SET/ENT.

If you do not operate any key for more than 5 minutes on the Parameter screen, the PR300 automatically returns to the Measured Value screen.

NOTE

If the upper and lower limits of scaling do not satisfy the following conditional expression, the updated upper or lower limit of scaling setpoint will not be incorporated but revert to the value before change.

Upper limit of scaling – Lower limit of scaling ≧ 50

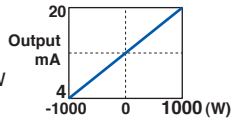
Parameter Setting Types and Ranges

Parameter Symbol	Parameter Name	Setting Type	Setting Range (Details)	Initial Value (Factory-set Value)
AnLoG	Analog output menu	———	Menu to shift to the parameters of analog output	———
A-SEL	Measurement item for analog output	Selection	Active power WATt Reactive power VARr Apparent power VA Voltage-1 V-1 Voltage-2 V-2 Voltage-3 V-3 Current-1 A-1 Current-2 A-2 Current-3 A-3 Power factor PF Frequency FrEQ	Active power
A-Lo	Lower limit of scaling	Fixed-point numeric value	0.0 to 50.0 (%)	50
A-HI	Upper limit of scaling	Fixed-point numeric value	50.0 to 100.0 (%)	100

Relationship between Scale Values and Measurement Inputs (Example)

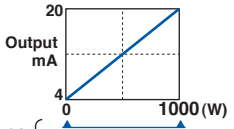
Active power

When setting output proportional to -1000 to 1000 W



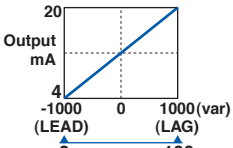
Scale values to be set: 0 (Lower limit), 100 (Upper limit)

When setting output proportional to 0 to 1000 W



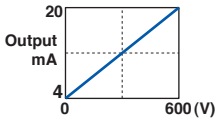
Scale values to be set: 50 (Lower limit), 100 (Upper limit)

Reactive power



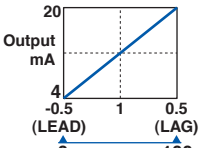
0 (Lower limit), 100 (Upper limit)

Voltage



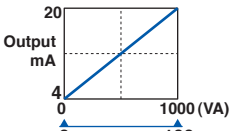
0 (Lower limit), 100 (Upper limit)

Power factor



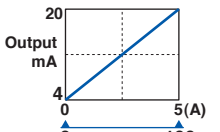
0 (Lower limit), 100 (Upper limit)

Apparent power



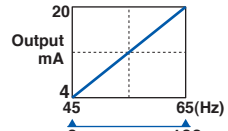
0 (Lower limit), 100 (Upper limit)

Current



0 (Lower limit), 100 (Upper limit)

Frequency



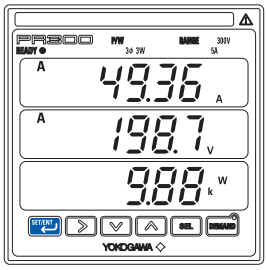
0 (Lower limit), 100 (Upper limit)

3.8 Setting Demand Measurement Conditions

This section explains how to set demand measurement conditions by taking as an example the case when the demand alarm point is changed to 300 kW and demand alarm release function to manual release, from their respective initial values.

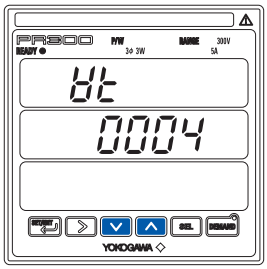
Operation

Measured Value screen



1 Hold down SET/ENT for at least 3 seconds.

VT Ratio screen



The parameter VT (VT ratio) appears.

2 Using ∨ or ∧, show dmnd.

Demand Measurement Menu screen

3 Press > once.

Demand Power/Current screen

The parameter d-SEL (demand power/current) appears.

4 Press ∨ once.

Demand Period screen

The parameter d-tIn (demand period) appears.

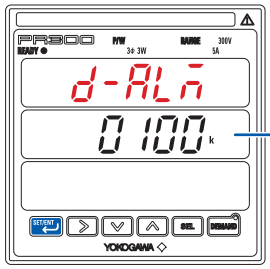
5 Press ∨ once.

Demand Alarm Mask Time screen

The parameter d-nSt (demand alarm mask time) appears.

6 Press ∨ once.

Demand Alarm Point screen

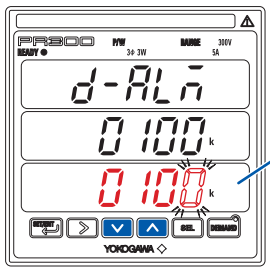


The parameter d-ALn (demand alarm point) appears.

Current value

7 Press SET/ENT once.

Demand Alarm Point Setting screen

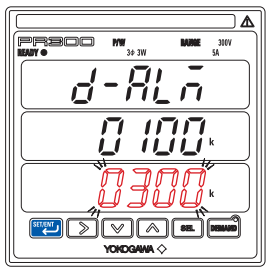


The screen changes to the one for setting the parameter d-ALn.

Setpoint

8 Using ∨ or ∧, change the setpoint.

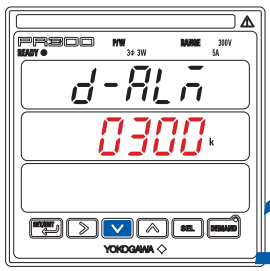
Demand Alarm Point Setting screen



To move to the digit to be changed, use the following keys:
- < To the left
- > To the right

9 Press SET/ENT twice to confirm the setpoint.

Demand Alarm Point screen

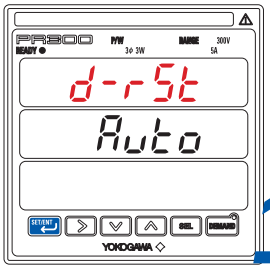


Pressing SET/ENT once causes all digits of the setpoint to start blinking. Pressing SET/ENT once again confirms the setpoint and returns to the Demand Alarm Point screen.

Demand alarm point setting completed.

10 Press ∨ once.

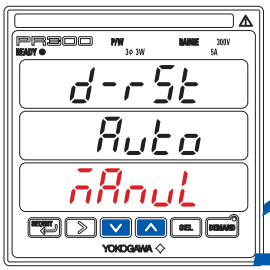
Demand Alarm Release Function screen



The parameter d-r5t (demand alarm release function) appears.

11 Press SET/ENT once.

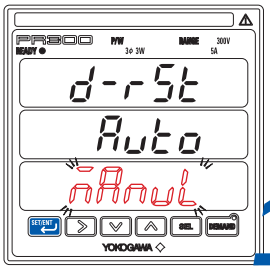
Demand Alarm Release Function Setting screen



The screen changes to the one for setting the parameter d-r5t.

12 Press ▽ or △ to change the setpoint.

Demand Alarm Release Function Setting screen



13 Press SET/ENT twice to confirm the setpoint.

Demand Alarm Release Function screen

Pressing SET/ENT once causes all digits of the setpoint to start blinking. Pressing SET/ENT once again confirms the setpoint and returns to the Demand Alarm Release Function screen.

To re-set the parameter:
Press any key other than SET/ENT while all digits of the setpoint are blinking.
The PR300 returns to the initial setting screen.

To return to the Pulse Output Menu screen, press SEL.

To return to the Measured Value screen, hold down SET/ENT.

If you do not operate any key for more than 5 minutes on the Parameter screen, the PR300 automatically returns to the Measured Value screen.

Demand alarm release function setting completed.

NOTE

If the demand period and demand alarm mask time do not satisfy the following conditional expression, the updated demand period or demand alarm mask time will not be incorporated but revert to the value before change.

Demand alarm mask time ≦ Demand period

Parameter Setting Types and Ranges

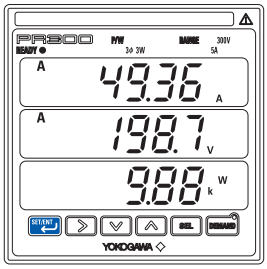
Parameter Symbol	Parameter Name	Setting Type	Setting Range (Details)	Initial Value (Factory-set Value)
dmnd	Demand measurement menu	———	Menu to shift to the parameters of demand measurement	———
d-SEL	Demand power/current	Selection	Active power YAtt Current A	Active power
d-tIn	Demand period	Integral numeric value	1 to 60 (min) (Demand alarm mask time to 60) (min)	30
d-nSt	Demand alarm mask time	Integral numeric value	1 to 59 (min) (1 to demand period) (min)	1
d-ALn	Demand alarm point	Integral numeric value	1 to 1000 (kW): When active power is selected, or 1 to 1000 (A): When current is selected	100
d-r5t	Demand alarm release function	Selection	Automatic release Auto Manual release nAnuL	Automatic release

3.9 Setting the Measured Value Display Pattern

This section explains how to set the measured value display pattern by taking as an example the case when the number of display patterns is changed to 3 and the display pattern-1 upper display to maximum demand value, from their respective initial values.

Operation

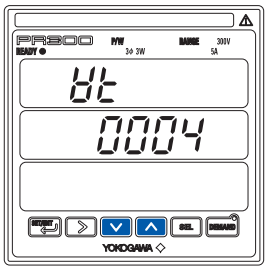
Measured Value screen



The parameter Vt (VT ratio) appears.

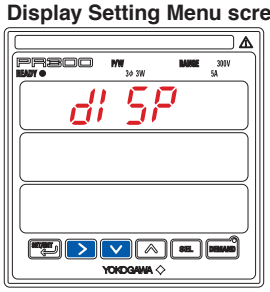
1 Hold down SET/ENT for at least 3 seconds.

VT Ratio screen



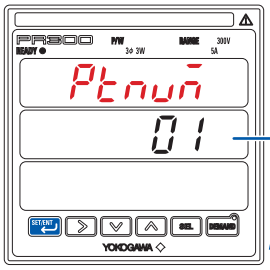
2 Using ▽ or △, show dISP.

Display Setting Menu screen



3 Press ▷ once. Press ▽ twice.

Number of Display Patterns screen

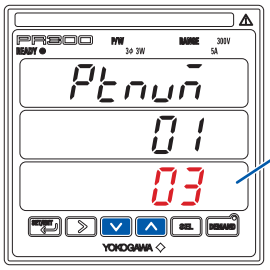


The parameter Ptnun (number of display patterns) appears.

Current value

4 Press SET/ENT once.

Number of Display Patterns Setting screen

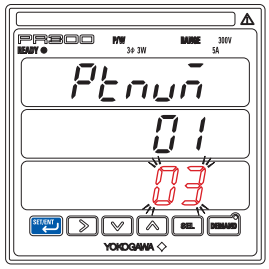


The screen changes to the one for setting the parameter Ptnun.

Setpoint

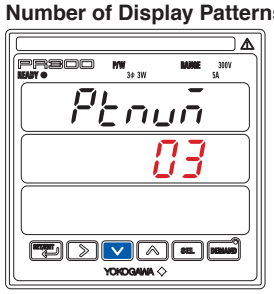
5 Using ▽ or △, change the setpoint.

Number of Display Patterns Setting screen



6 Press SET/ENT twice to confirm the setpoint.

Number of Display Patterns screen

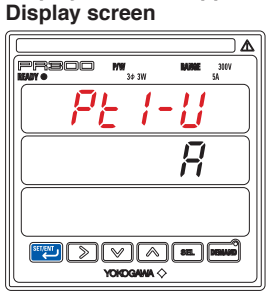


Pressing SET/ENT once causes all digits of the setpoint to start blinking. Pressing SET/ENT once again confirms the setpoint and returns to the Number of Display Patterns screen.

Number of display patterns setting completed.

7 Press ▽ once.

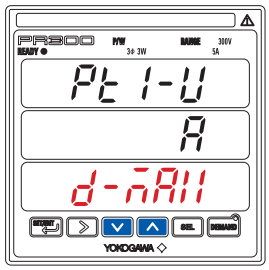
Display Pattern-1 Upper Display screen



The parameter Pt 1-U (display pattern-1 upper display) appears.

8 Press SET/ENT once.

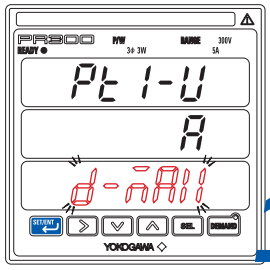
Display Pattern-1 Upper Display Setting screen



The screen changes to the one for setting the parameter Pt 1-U.

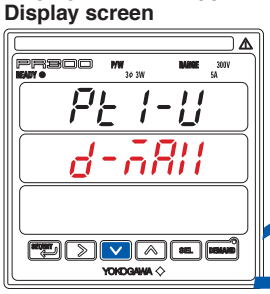
9 Using ▽ or △, change the setpoint.

Display Pattern-1 Upper Display Setting screen



10 Press SET/ENT twice to confirm the setpoint.

Display Pattern-1 Upper Display screen

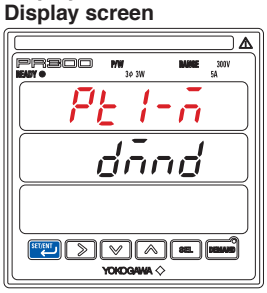


To re-set the parameter:
Press any key other than SET/ENT while all digits of the setpoint are blinking.
The PR300 returns to the initial setting screen.

Display pattern-1 upper display setting completed.

11 Press ▽ once.

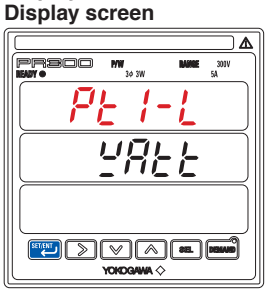
Display Pattern-1 Middle Display screen



The parameter Pt 1-n (display pattern-1 middle display) appears.

Refer to steps *8*, *9* and *10* to also set other display patterns.

Display Pattern-1 Lower Display screen



To return to the Display Setting Menu screen, press SEL.

To return to the Measured Value screen, hold down SET/ENT.

If you do not operate any key for more than 5 minutes on the Parameter screen, the PR300 automatically returns to the Measured Value screen.

Parameter Setting Types and Ranges

Parameter Symbol	Parameter Name	Setting Type	Setting Range (Details)	Initial Value (Factory-set Value)
diSP	Display setting menu	———	Menu to shift to the parameters of display setting	———
Ptnun	Number of display patterns	Integral numeric value	1 to 8	1
Pt 1-U	Display pattern-1 upper display	Selection	A measurement item can be selected from the following: None: nonE Active energy: Wh Regenerative energy: -Wh LEAD reactive energy: -varh LAG reactive energy: varh Apparent energy: VAh Active power: VAtt Reactive power: var Apparent power: VA Voltage (phase switch inidication): V Voltage-1: V-1 Voltage-2: V-2 Voltage-3: V-3 Current (phase switch inidication): A Current-1: A-1 Current-2: A-2 Current-3: A-3 Power factor: PF Frequency: FrEq Optional active energy: WhoP Demand value: dnnd Maximum demand value: d-nAll	Current (phase switch inidication)
Pt 1-n	Display pattern-1 middle display			Voltage (phase switch inidication)
Pt 1-L	Display pattern-1 lower display			Active power
Pt2-U	Display pattern-2 upper display	Selection		Active power
Pt2-n	Display pattern-2 middle display			Reactive power
Pt2-L	Display pattern-2 lower display			Power factor
Pt3-U	Display pattern-3 upper display	Selection		Active energy
Pt3-n	Display pattern-3 middle display			LEAD reactive energy
Pt3-L	Display pattern-3 lower display			Apparent energy
Pt4-U	Display pattern-4 upper display	Selection		Current-1
Pt4-n	Display pattern-4 middle display			Current-2
Pt4-L	Display pattern-4 lower display			Current-3

- Continued to next page -

Parameter Setting Types and Ranges (Continued)

Parameter Symbol	Parameter Name	Setting Type	Setting Range (Details)	Initial Value (Factory-set Value)
PtS-U	Display pattern-5 upper display	Selection	A measurement item can be selected from the following:	
PtS-M	Display pattern-5 middle display		None (nonE)	Voltage-1
PtS-L	Display pattern-5 lower display		Active energy (WH)	Voltage-2
PtG-U	Display pattern-6 upper display	Selection	Regenerative energy (-WH)	
PtG-M	Display pattern-6 middle display		LEAD reactive energy (-varh)	Voltage-3
PtG-L	Display pattern-6 lower display		LAG reactive energy (varh)	
Pt7-U	Display pattern-7 upper display	Selection	Apparent energy (VAh)	Current (phase switch inidication)
Pt7-M	Display pattern-7 middle display		Active power (WATt)	
Pt7-L	Display pattern-7 lower display		Reactive power (var)	Voltage (phase switch inidication)
Pt8-U	Display pattern-8 upper display	Selection	Apparent power (VA)	
Pt8-M	Display pattern-8 middle display		Voltage (phase switch inidication) (U)	Frequency
Pt8-L	Display pattern-8 lower display		Voltage-1 (U-1)	
			Voltage-2 (U-2)	Current (phase switch inidication)
			Voltage-3 (U-3)	
			Current (phase switch inidication) (A)	Active power
			Current-1 (A-1)	
			Current-2 (A-2)	Power factor
			Current-3 (A-3)	
			Power factor (PF)	Active power
			Frequency (FrEQ)	
			Optional active energy (WhoP)	Maximum demand value
			Demand value (dmnd)	
			Maximum demand value (d-mAX)	Demand value

Number of Display Patterns and Individual Display Patterns

Allocate desired measurement items to the upper, middle and lower displays of the PR300, respectively, to define the display view as a single display pattern. It is possible to define a maximum of 8 patterns. For the number of display patterns, specify how many of these defined display patterns the PR300 should show.

NOTE

- **As shown in the table below, some measurement items cannot be measured depending on the type of phase and wire system. Measurement items that cannot be measured cannot be selected as options for a display pattern.**
- **In the case of a three-phase four-wire system, the initial values of display patterns-1 to 8 can all be shown on the PR300. For phase and wire systems other than a three-phase four-wire system, measurement items that cannot be measured are shown as "nonE".**

Measurement item \ Phase and wire system	Single-phase two-wire system	Single-phase three-wire system	Three-phase three-wire system	Three-phase four-wire system	Three-phase four-wire system (2.5 element)
Current (phase switch inidication)	–	✔	✔	✔	✔ *1
Current-1	✔	✔	✔	✔	✔ *1
Current-2	–	✔	–	✔	–
Current-3	–	–	✔	✔	✔ *1
Voltage-2	–	✔	–	✔	–
Voltage-3	–	–	✔	✔	✔

✔: Measurable. –: Not measurable.

***1 For a three-phase four-wire systems (2.5 element), it is possible to set the following measurement items only when the current is in a state of equilibrium:**
Current (phase switch indication), Current-1, Current-3, Reactive power, Apparent power, Power factor, LEAD reactive energy, LAG reactive energy, and Apparent energy.

- **The demand value and maximum demand value can only be selected for a PR300 with the demand measuring function. For a PR300 without the demand measuring function, the initial values of demand value and maximum demand value are shown as "nonE".**

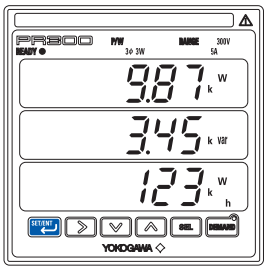
3.10 Setting the "Indicator-out" Mode and Locking Parameters

Setting the Indicator-out Mode

This section explains how to set the indicator-out mode by taking as an example the case when the indicator-out mode is changed to ON and the indicator-out mode wait time to 5 min, from their respective initial values.

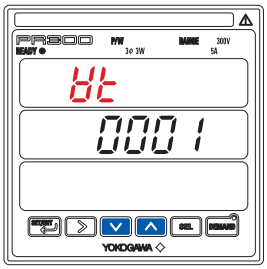
Operation

Measured Value screen



1 Hold down SET/ENT for at least 3 seconds.

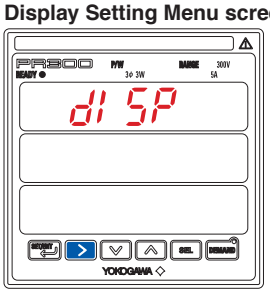
VT Ratio screen



The parameter VT (VT ratio) appears.

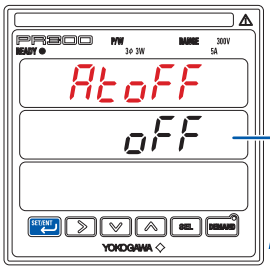
2 Using ▽ or △, show dISP.

Display Setting Menu screen



3 Press ▷ once.

Indicator-out Mode screen

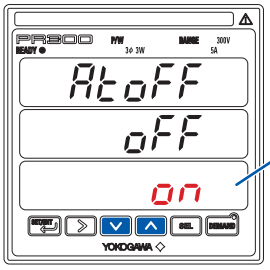


The parameter AtoFF (Indicator-out mode) appears.

Current value

4 Press SET/ENT once.

Indicator-out Mode Setting screen

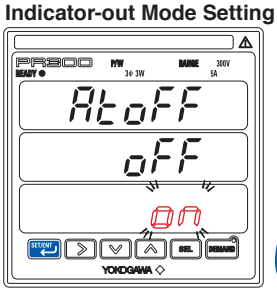


The screen changes to the one for setting the parameter AtoFF.

Setpoint

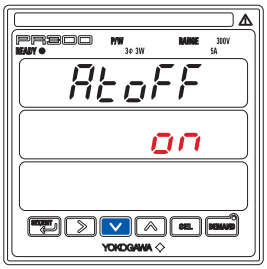
5 Press ▽ or △, change the setpoint.

Indicator-out Mode Setting screen



6 Press SET/ENT twice to confirm the setpoint.

Indicator-out Mode screen



Pressing SET/ENT once causes all digits of the setpoint to start blinking. Pressing SET/ENT once again confirms the setpoint and returns to the Indicator-out Mode screen.

Indicator-out mode setting completed.

7 Press ▽ once.

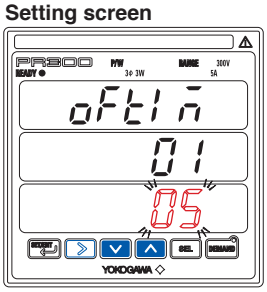
Indicator-out Mode Wait Time screen

Parameter oFtIn (indicator-out mode wait time) is displayed.

The screen changes into a screen for setting parameter oFtIn.

8 Press SET/ENT once.

Indicator-out Mode Wait Time Setting screen



9 Using ▽ or △, change the setpoint.

Press SET/ENT twice to confirm the setpoint.

Indicator-out Mode Wait Time screen

Indicator-out mode wait time setting completed

- **Use ▷ to move to the digit to be changed.**
- **To re-set the parameter:** Press any key other than SET/ENT while all digits of the setpoint are blinking. The PR300 returns to the initial setting screen.
- **To return to the Ethernet Communication Menu screen, press SEL.**

Parameter Setting Types and Ranges

Parameter Symbol	Parameter Name	Setting Type	Setting Range (Details)	Initial Value (Factory-set Value)
dISP	Display setting menu	———	Menu to shift to the parameters of display setting	———
AtoFF	Indicator-out mode	Selection	ON on OFF oFF	OFF
oFtIn	Indicator-out mode wait time	Integral numeric value	1 to 60 (min)	10 (min)

Indicator-out mode

The indicator-out mode is designed to turn off the PR300 display when no key operation is performed within the indicator-out mode wait time that has been set while measured values are on display. The PR300 switches to the Measured Value screen in about 5 minutes when no key operation is performed while the Parameter screen is on display. Then, the PR300 display turns off after the elapse of the indicator-out mode wait time from when the PR300 switched to the Measured Value screen.
To turn on the PR300 display to show measured values during indicator-out mode, press any key.

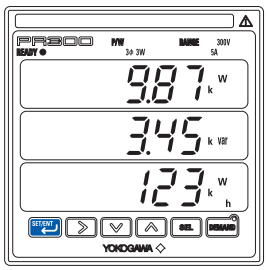
Locking and Unlocking Parameters

Executing the following operations locks or unlocks all parameters. (A parameter cannot be locked or unlocked individually.) If a parameter is locked, it will be impossible to shift to the Parameter Setting screen. Use the Parameter screen showing the current value or the Menu screen to lock or unlock parameters. Operations used on an individual parameter setting screen or on the Measured Value screen in an attempt to lock parameters will have no effect.

Locking Parameters

Operation

Measured Value screen



1 **Hold down SET/ENT for at least 3 seconds.**

VT Ratio screen

The parameter VT (VT ratio) appears.

2 **Simultaneously hold down SET/ENT and ∧ for at least 5 seconds.**

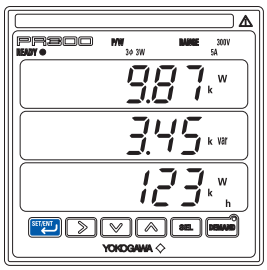
The measured value display (middle display) first shows LocY, then returns to the Parameter screen.

All parameters are locked now. Pressing SET/ENT will no longer switch the display to any parameter setting screen.

Unlocking Parameters

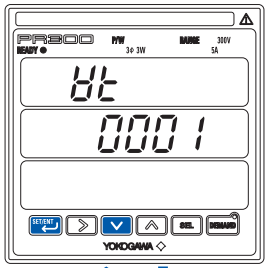
Operation

Measured Value screen



1 **Hold down SET/ENT for at least 3 seconds.**

VT Ratio screen



The parameter VT (VT ratio) appears.

2 **Simultaneously hold down SET/ENT and ∨ for at least 5 seconds.**

The measured value display (upper display) first shows FrEE, then returns to the Parameter screen.

All parameters are unlocked now.

4.1 Measurement Items

✔ : Measurable, – : Not measurable

Measurement items	Single-phase two-wire system	Single-phase three-wire system	Three-phase three-wire system	Three-phase four-wire system	Three-phase four-wire system (2.5 element)	Unit and symbol
Active energy (+) *1	✔	✔	✔	✔	✔	kWh/MWh
Active energy (-) (regenerative energy) *1	✔	✔	✔	✔	✔	-kWh/-MWh
LEAD reactive energy (-) *1	✔	✔	✔	✔	✔	-kvarh/-Mvarh
LAG reactive energy (+) *1	✔	✔	✔	✔	✔	kvarh/Mvarh
Apparent energy *1	✔	✔	✔	✔	✔	kVAh/MVAh
Optional active energy *1	✔	✔	✔	✔	✔	Wh
Active power Instantaneous value / Maximum value / Minimum value	✔	✔	✔	✔	✔	W/kW/MW
Reactive power Instantaneous value / Maximum value / Minimum value	✔	✔	✔	✔	✔	var/kvar/Mvar
Apparent power Instantaneous value / Maximum value / Minimum value	✔	✔	✔	✔	✔	VA/kVA/MVA
Voltage-1 Instantaneous value / Maximum value / Minimum value	✔	✔	✔	✔	✔	V/kV
Voltage-2 Instantaneous value / Maximum value / Minimum value	–	✔	–	✔	–	
Voltage-3 Instantaneous value / Maximum value / Minimum value	–	–	✔	✔	✔	
Current-1 Instantaneous value / Maximum value	✔	✔	✔	✔	✔	A/kA
Current-2 Instantaneous value / Maximum value	–	✔	–	✔	–	
Current-3 Instantaneous value / Maximum value	–	–	✔	✔	✔	
Frequency Instantaneous value / Maximum value / Minimum value	✔	✔	✔	✔	✔	Hz
Power factor Instantaneous value / Maximum value / Minimum value	✔	✔	✔	✔	✔	COSø
Demand power *2 Maximum value	✔	✔	✔	✔	✔	W/kW/MW
Demand current-1 *2 Maximum value	✔	✔	✔	✔	✔	A/kA
Demand current-2 *2 Maximum value	–	✔	–	✔	–	
Demand current-3 *2 Maximum value	–	–	✔	✔	✔	

*1: An integrated low-cut power can be set to the energy parameters listed in the table (refer to Section 3.3).
*2: Either the demand power or demand current can be set as a measurement item.

NOTE

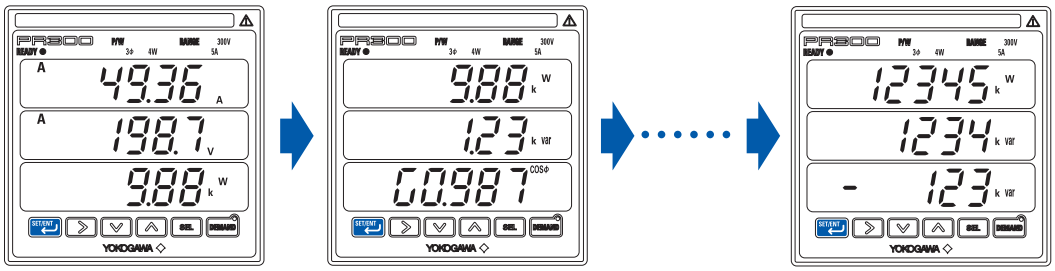
When the current is in a state of equilibrium, the three-phase four-wire system (2.5 element) can measure the following items: LEAD reactive energy, LAG reactive energy, Apparent energy, Reactive power, Apparent power, Current-1, Current-3, Power factor, Demand current-1, and Demand current-3.

4.2 Switching Display Pattern

According to Display patterns-1 to 8, the PR300 can change the measurement items to be assigned to the upper, middle, and lower displays (refer to Section 3.9, “Setting the Measured Value Display Pattern”). The procedure to change the display pattern and initial values are explained below.

Switching Display Pattern

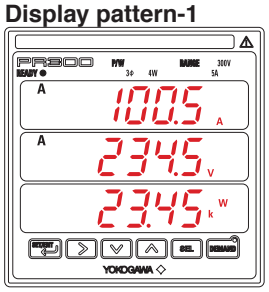
Display pattern-1 | Display pattern-2 | Display pattern-n (up to 8)



The initial value is “Display pattern-1,” and the display pattern number will be incremented by 1 every time SET/ENT is pressed. After the number reaches n, it will return to 1.

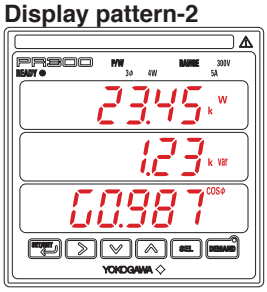
Example Display Patterns and Initial Values

Display pattern-1



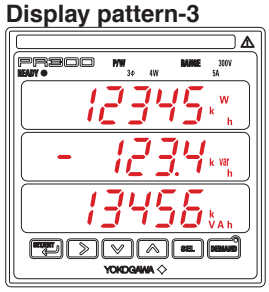
Upper display	Current (phase switch indication)
Middle display	Voltage (phase switch indication)
Lower display	Active power

Display pattern-2



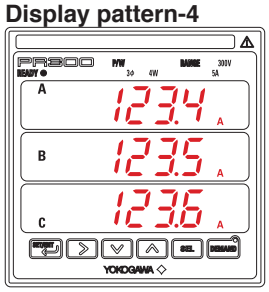
Upper display	Active power
Middle display	Reactive power
Lower display	Power factor

Display pattern-3



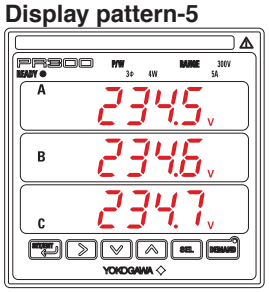
Upper display	Active energy
Middle display	LEAD reactive energy
Lower display	Apparent energy

Display pattern-4



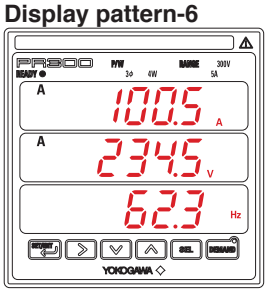
Upper display	Current-1
Middle display	Current-2
Lower display	Current-3

Display pattern-5



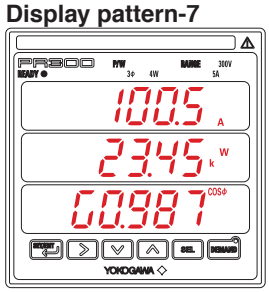
Upper display	Voltage-1
Middle display	Voltage-2
Lower display	Voltage-3

Display pattern-6



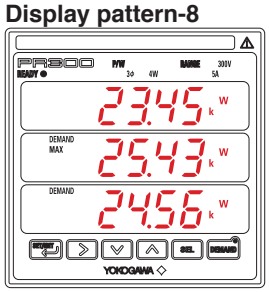
Upper display	Current (phase switch indication)
Middle display	Voltage (phase switch indication)
Lower display	Frequency

Display pattern-7



Upper display	Current (phase switch indication)
Middle display	Active power
Lower display	Power factor

Display pattern-8

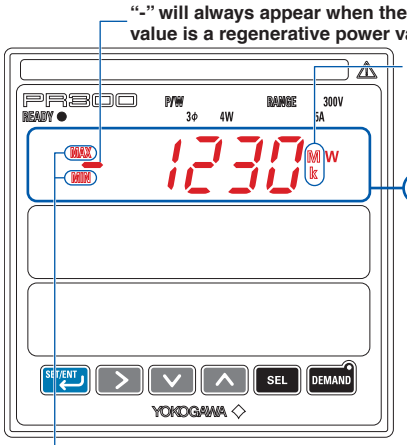


Upper display	Active power
Middle display	Maximum demand value
Lower display	Demand value

As below, “NONE” appears in the display of a measurement item whose value cannot be displayed due to the specifications of the PR300.

4.3 Displaying Measured, Instantaneous, and Maximum/Minimum Values

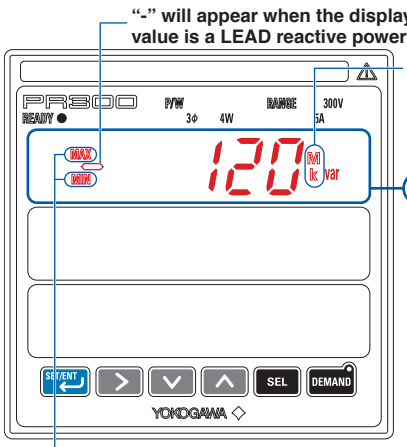
Example Display and Measuring Ranges of Active Power (Regenerative Power)



Secondary rated power × 1.2 × VT ratio × CT ratio	Measuring range
6 W to less than 100 W	0.00 to 99.99 W
100 W to less than 1 kW	0.0 to 999.9 W
1 kW to less than 10 kW	0 to 9999 W
10 kW to less than 100 kW	0.00 to 99.99 kW
100 kW to less than 1 MW	0.0 to 999.9 kW
1 MW to less than 10 MW	0 to 9999 kW
10 MW to less than 100 MW	0.00 to 99.99 MW
100 MW to less than 1 GW	0.0 to 999.9 MW
1 GW or greater	0 to 9999 MW

The following will appear when the measurement is out of range:

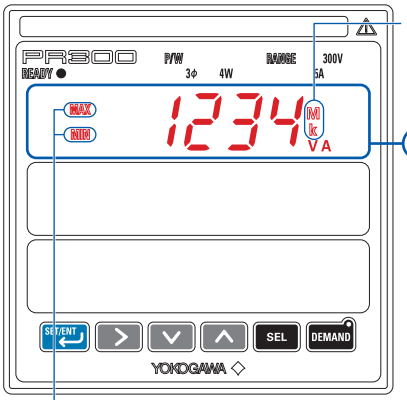
Example Display and Measuring Ranges of Reactive Power



Secondary rated power × 1.2 × VT ratio × CT ratio	Measuring range
6 W to less than 100 W	0.00 to 99.99 var
100 W to less than 1 kW	0.0 to 999.9 var
1 kW to less than 10 kW	0 to 9999 var
10 kW to less than 100 kW	0.00 to 99.99 kvar
100 kW to less than 1 MW	0.0 to 999.9 kvar
1 MW to less than 10 MW	0 to 9999 kvar
10 MW to less than 100 MW	0.00 to 99.99 Mvar
100 MW to less than 1 GW	0.0 to 999.9 Mvar
1 GW or greater	0 to 9999 Mvar

The following will appear when the measurement is out of range:

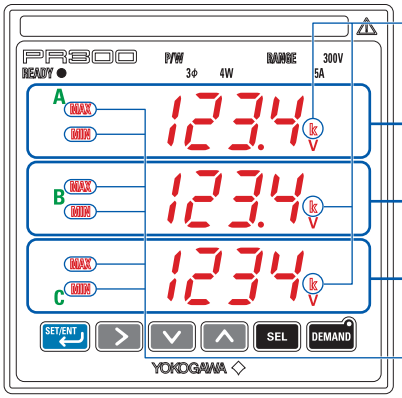
Example Display and Measuring Ranges of Apparent Power



Secondary rated power × 1.2 × VT ratio × CT ratio	Measuring range
6 W to less than 100 W	0.00 to 99.99 VA
100 W to less than 1 kW	0.0 to 999.9 VA
1 kW to less than 10 kW	0 to 9999 VA
10 kW to less than 100 kW	0.00 to 99.99 kVA
100 kW to less than 1 MW	0.0 to 999.9 kVA
1 MW to less than 10 MW	0 to 9999 kVA
10 MW to less than 100 MW	0.00 to 99.99 MVA
100 MW to less than 1 GW	0.0 to 999.9 MVA
1 GW or greater	0 to 9999 MVA

The following will appear when the measurement is out of range:

Example Display and Measuring Ranges of Voltage



Supplementary unit (refer to the table on the right)

Voltage-1

Voltage-2

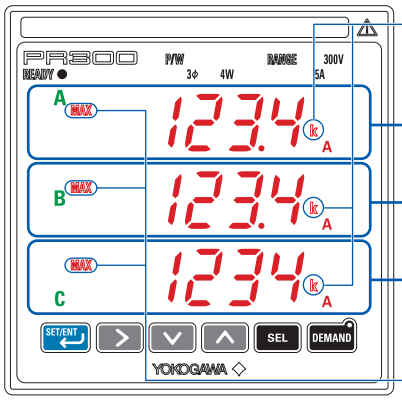
Voltage-3

MAX: Turns on while the maximum value is displayed.
MIN: Turns on while the minimum value is displayed.

Secondary rated voltage × 1.2 × VT ratio	Measuring range
100 V to less than 1 kV	0.0 to 999.9 V
1 kV to less than 10 kV	0 to 9999 V
10 kV to less than 100 kV	0.00 to 99.99 kV
100 kV to less than 1 MV	0.0 to 999.9 kV
1 MV to less than 10 MV	0 to 9999 kV

The following will appear when the measurement is out of range:

Example Display and Measuring Ranges of Current



Supplementary unit (refer to the table on the right)

Current-1

Current-2

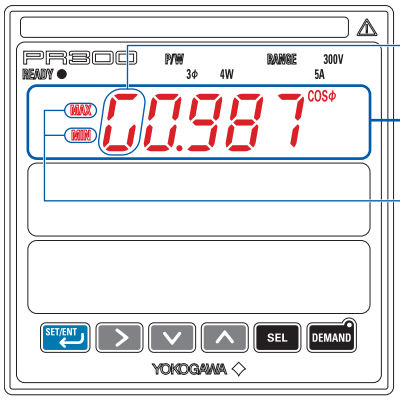
Current-3

MAX: Turns on while the maximum value is displayed.

Secondary rated current × 1.2 × CT ratio	Measuring range
0.06 A to less than 10 A	0.000 to 9.999 A
10 A to less than 100 A	0.00 to 99.99 A
100 A to less than 1 kA	0.0 to 999.9 A
1 kA to less than 10 kA	0 to 9999 A
10 kA to less than 100 kA	0.00 to 99.99 kA
100 kA to less than 1 MA	0.0 to 999.9 kA

The following will appear when the measurement is out of range:

Example Display and Measuring Ranges of Power Factor



Indicates that the value is lagging power factor.

Power factor

Indicates that the value is leading power factor.

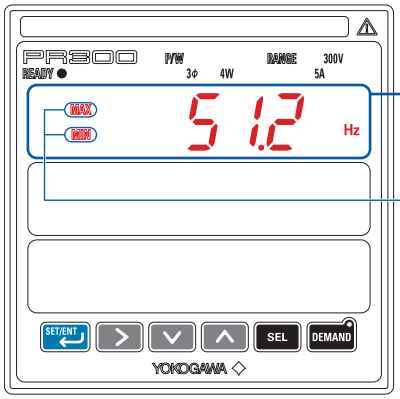
MAX: Turns on while the maximum value is displayed.
MIN: Turns on while the minimum value is displayed.

The following will appear when the measurement is out of range:

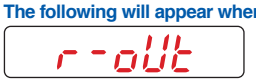
Measuring range: -0.500 to less than 1 (for leading power factor), 1, 0.500 to less than 1 (for lagging power factor)

Example Display and Measuring Ranges of Frequency

The frequency of Voltage-1 is displayed.



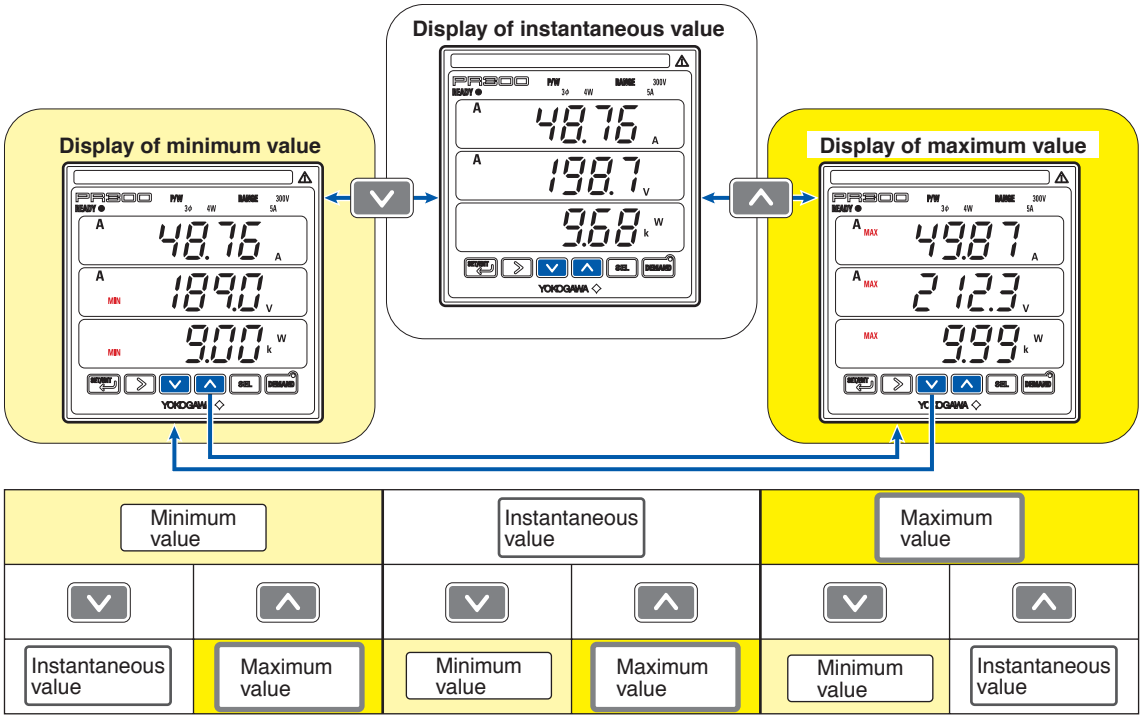
The following will appear when the measurement is out of range:



Measuring range: 45.0 to 65.0 Hz

How to Switch between Instantaneous Value, Maximum Value, and Minimum Value

- For active power (regenerative power), reactive power, apparent power, voltage, power factor, and frequency, the instantaneous value, the maximum value, and the minimum value can be switched for display using the operation keys (or).
- For current, the instantaneous value and the maximum value can be switched for display also using operation keys.
- The maximum and minimum values being displayed are those after resetting or after turning on the power.



NOTE

Turn the PR300 off/on by the power supply or perform remote resetting via communication in order to reset the instantaneous, maximum, and minimum values of measurements.

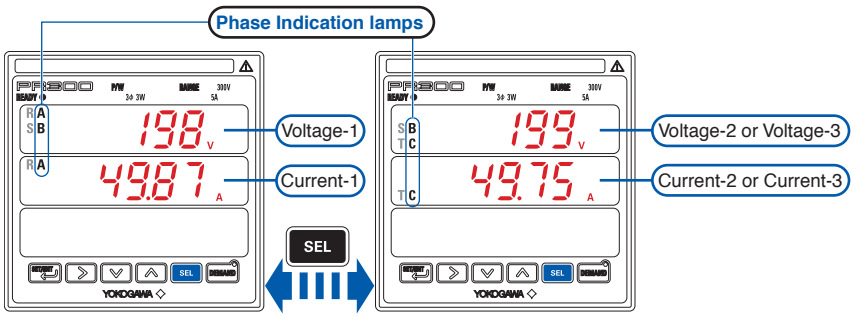
4.4 Phase Switching for Voltage and Current

Using an operation key (SEL) of the PR300, the user can switch the phase of voltage, current, and demand current (*1) for display.

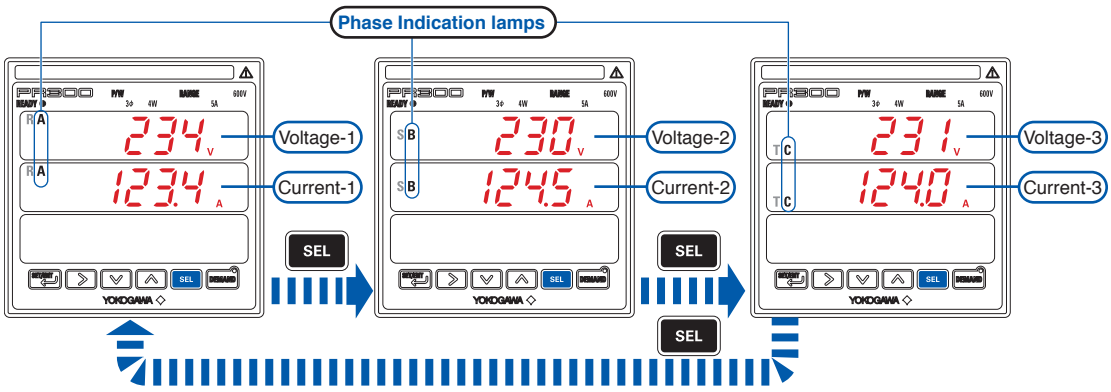
- For this phase switching, “Voltage (phase switch indication),” “Current (phase switch indication),” and “Demand current (*1)” must be set to the display pattern, and those settings seen on the Measured Value screen.

*1 Only the PR300 with the demand measuring function can handle demand current.

How to Switch the Phase for Single-phase Three-wire, Three-phase Three-wire and Three-phase Four-wire (2.5 element) Systems



How to Switch the Phase for Three-phase Four-wire System



How to Read the Phase Indication Lamp

Phase and wire system	Voltage	Phase indication lamp turning on		Current	Phase indication lamp turning on	
		A,B,C	R,S,T		A,B,C	R,S,T
Single-phase two-wire system	Voltage-1	A	R	Current-1	A	R
Single-phase three-wire system	Voltage-1	A, B	R, S	Current-1	A	R
	Voltage-2	B, C	S, T	Current-2	C	T
Three-phase three-wire system	Voltage-1	A, B	R, S	Current-1	A	R
	Voltage-3	B, C	S, T	Current-3	C	T
Three-phase four-wire system	Voltage-1	A	R	Current-1	A	R
	Voltage-2	B	S	Current-2	B	S
	Voltage-3	C	T	Current-3	C	T
Three-phase four-wire system (2.5 element)	Voltage-1	A	R	Current-1	A	R
	Voltage-3	C	T	Current-3	C	T

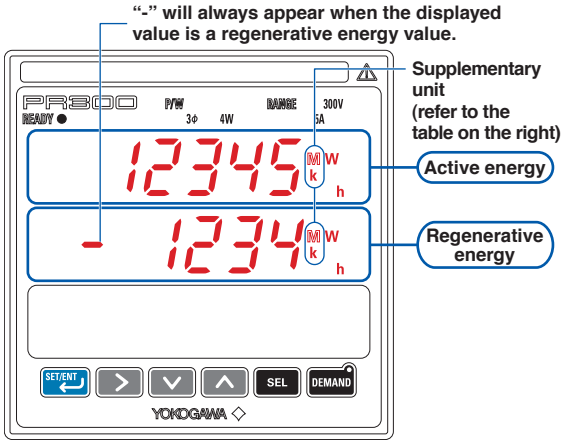
NOTE

- The phase indication lamps (“A,B,C” or “R,S,T”) chosen at the time of ordering are turned on. This setting cannot be changed after delivery.
- In the single-phase two-wire system, phase indication lamp “A” or “R” turns on. This setting cannot be changed.
- In the three-phase four-wire system (2.5 element), the current can be measured only when it is in a state of equilibrium.

4.5 Displaying Energy Values

This section explains the measuring range and display method of active energy, regenerative energy, LEAD reactive energy, LAG reactive energy, and apparent energy.

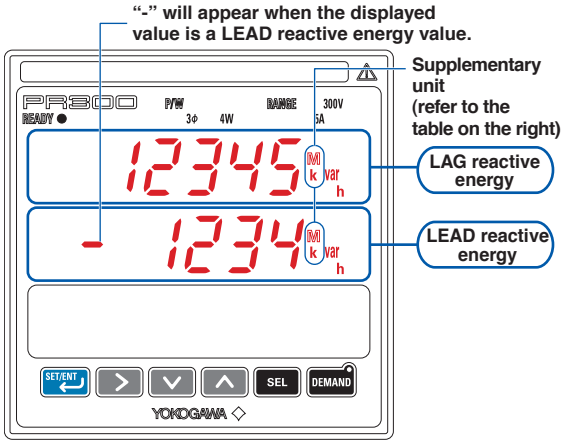
Example Display and Measuring Ranges of Active Energy and Regenerative Energy



Type	Secondary rated power × VT ratio × CT ratio	Measuring range
A	Less than 100 kW	0 to 99999 kWh
B	100 kW to less than 1 MW	0.00 to 999.99 MWh
C	1 MW to less than 10 MW	0.0 to 9999.9 MWh
D	10 MW or greater	0 to 99999 MWh

* For all the four types in the table, decimal places that are not appearing can be displayed by key operation (refer to "Operation for Energy Value Display" on the next page).

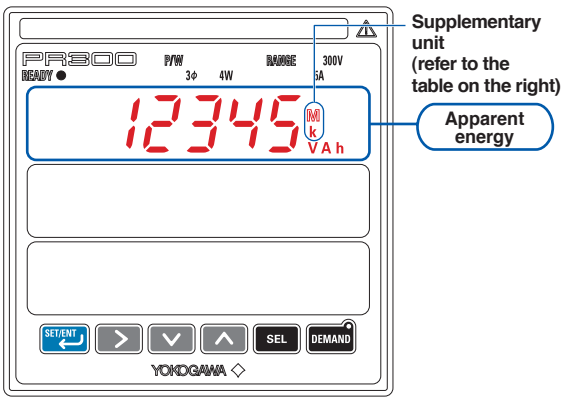
Example Display and Measuring Ranges of LEAD Reactive Energy and LAG Reactive Energy



Type	Secondary rated power × VT ratio × CT ratio	Measuring range
A	Less than 100 kW	0 to 99999 kvarh
B	100 kW to less than 1 MW	0.00 to 999.99 Mvarh
C	1 MW to less than 10 MW	0.0 to 9999.9 Mvarh
D	10 MW or greater	0 to 99999 Mvarh

* For all the four types in the table, decimal places that are not appearing can be displayed by key operation (refer to "Operation for Energy Value Display" on the next page).

Example Display and Measuring Ranges of Apparent Energy



Type	Secondary rated power × VT ratio × CT ratio	Measuring range
A	Less than 100 kW	0 to 99999 kVAh
B	100 kW to less than 1 MW	0.00 to 999.99 MVAh
C	1 MW to less than 10 MW	0.0 to 9999.9 MVAh
D	10 MW or greater	0 to 99999 MVAh

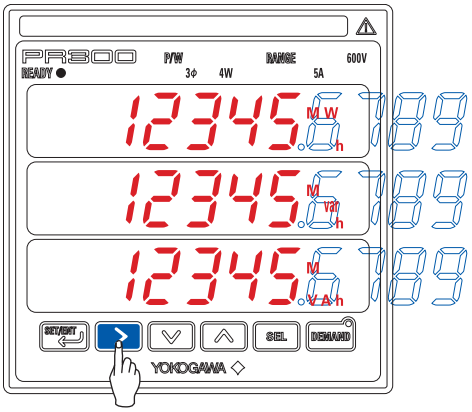
* For all the four types in the table, decimal places that are not appearing can be displayed by key operation (refer to "Operation for Energy Value Display" on the next page).

NOTE

When the power is below the integrated low-cut power, it is not integrated as energy.

Operation for Energy Value Display

For all measurement ranges of active energy, regenerative energy, LEAD reactive energy, LAG reactive energy, and apparent energy, decimal places that are not appearing can be displayed by key operation.

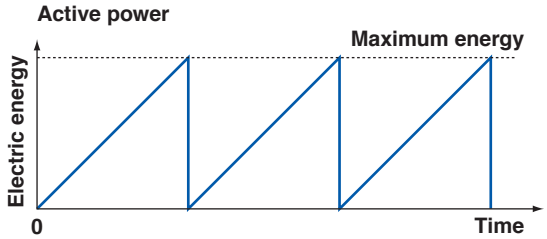


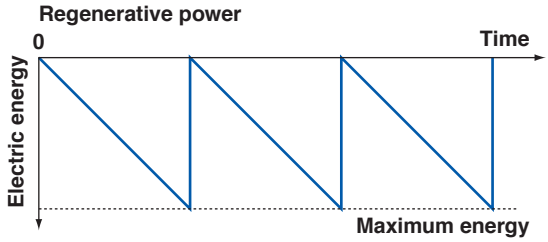
- The digits being displayed are in [ ] in the table below. The figures that are not highlighted are not displayed and not visible.
- Every time [>] is pressed, the display order is incremented by 1. If [>] is pressed when the smallest digit is appearing, the display will return to the initial value (the display order returns to 1).
- If there is no key entry for 60 minutes after shifting the displayed digits, the display will automatically return to the initial value (the display order returns to 1).

Display order	Type A	Display order	Type B
1	12345.6	1	123.456 7
2	2345.6	2	23.456 7
		3	3.4567

Display order	Type C	Display order	Type D
1	1234.56 78	1	12345.6 789
2	234.567 8	2	2345.67 89
3	34.5678	3	345.678 9
4	4.5678	4	45.678
		5	5.6789

As can be seen in the figures below, the energy value returns to 0 after reaching the maximum energy value.





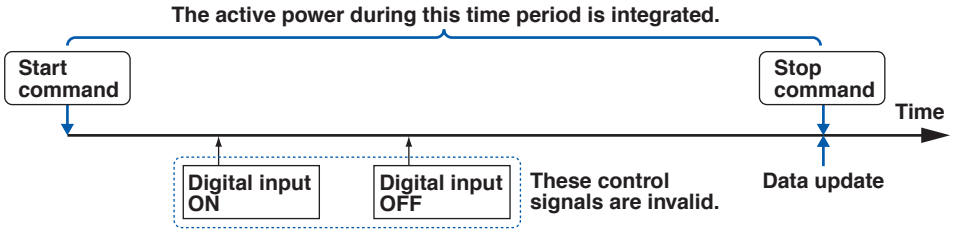
Optional Integrating Function

The optional integrating function integrates the active power while the control signal for optional integration is activated (ON for activating and OFF for deactivating). The operation for this signal can be performed via communication or by digital input.

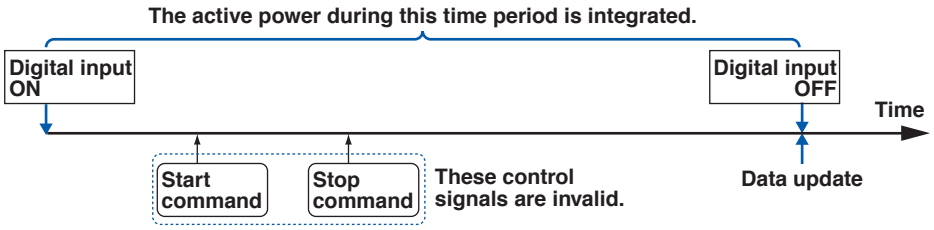
NOTE

- **If power failure occurs during integration, an optional integrated value may not be guaranteed.**
- **The control signal for optional integration of the PR300 with the demand measuring function can be controlled only via communication. It is not possible by digital input.**
- **The active power below the integrated low-cut power cannot be integrated.**
- **Once the control signal for optional integration is controlled via communication, communication is the only means for controlling that signal until system reset* is performed. The same applies to control by digital input.**
  *** System reset can be performed by turning off/on the power supply for the PR300 or by executing remote reset via communication.**
- **When the system is reset, the optional integrated value is reset to 0.**

Example operation of the control signal for optional integration via communication



Example operation of the control signal for optional integration by digital input



Digital input
Number of inputs: 1
Input signal: ON signal 4.5 to 25 V DC, OFF signal within ±1 V DC

Maximum integrated value
99999 Wh (After the integrated value reaches this maximum value, it returns to “0.”)

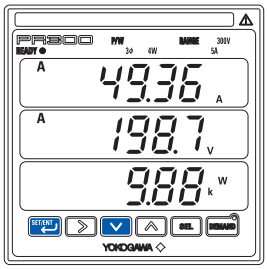
Data update
When the control signal for optional integration is turned off and then turned on:
The displayed measured value is reset to 0, and integration starts. The integrated value before resetting (previous value) can be confirmed via communication.
When the control signal for optional integration is turned on for a while and turned off later:
The displayed measured value is the integrated value. This value display is retained until the control signal for optional integration is turned on again.

4.6 Resetting Measured Values

Resetting Maximum and Minimum Values

Operation

Measured Value screen



1 Simultaneously hold down SET/ENT and ▽ for at least 5 seconds.

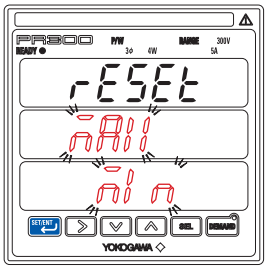
Reset Item Selection screen

The Reset Item Selection screen appears.

Reset items

2 Display the reset items on the screen (refer to the left figure) using ▽ or △ and press SET/ENT once.

Reset Item Confirmation screen



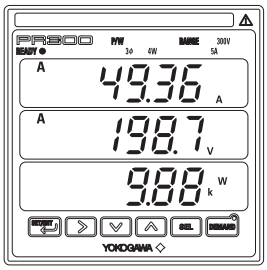
The Reset Item Confirmation screen appears, and the reset items blinks.

To stop resetting
To change the reset items

Press any key other than SET/ENT while the reset items are blinking.
The PR300 returns to the Reset Item Selection screen.

3 Press SET/ENT once.

Measured Value screen



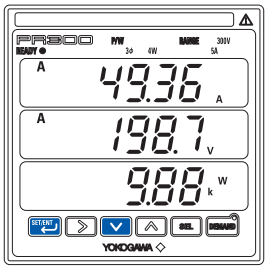
The maximum and minimum values are reset, and the PR300 returns to the Measured Value screen.

To cancel resetting and return to the Measured Value screen, refer to "Canceling Resetting" on the next page.

Resetting Energy Value

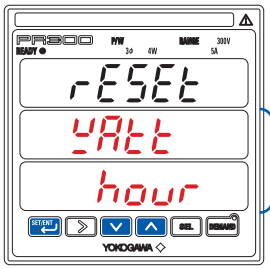
Operation

Measured Value screen



1 Hold down SET/ENT and ▽ for at least 5 seconds.

Reset Item Selection screen

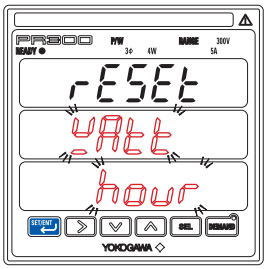


The Reset Item Selection screen appears.

Reset items

2 Display the reset items on the screen (refer to the left figure) using ▽ or △ and press SET/ENT once.

Reset Item Confirmation screen



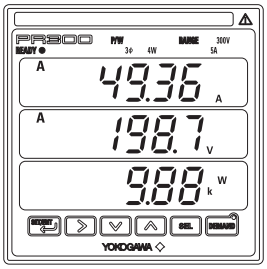
The Reset Item Confirmation screen appears, and the reset items blinks.

To stop resetting
To change the reset items

Press any key other than SET/ENT while the reset items are blinking.
The PR300 returns to the Reset Item Selection screen.

3 Press SET/ENT key once.

Measured Value screen



The energy value is reset, and the PR300 returns to the Measured Value screen.

To cancel resetting and return to the Measured Value screen, refer to "Canceling Resetting" on the next page.

NOTE

After resetting is performed and the reset measured value is displayed on the Measured Value screen, "RESET" will appear for about 1 second.

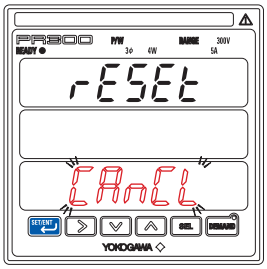
Canceling Resetting

Operation

Reset Item Selection screen

1 On the Reset Item Selection screen, press ▼ or ▲ to bring up CAnCL and press SET/ENT once.

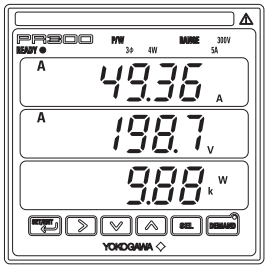
Reset Item Confirmation screen



The Reset Item Confirmation screen appears, and the reset item blinks.

2 Press SET/ENT once.

Measured Value screen



The measured value is not reset, and the PR300 returns to the Measured Value screen.

Reset Items and Details

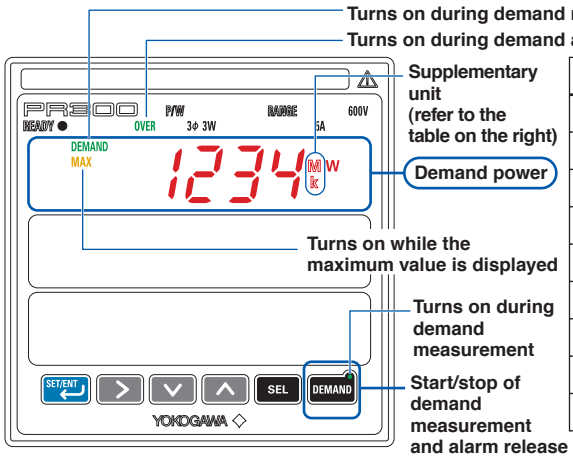
Reset Item Symbol	Reset Item Names	Details
rAll / rln	Maximum/minimum value reset	The maximum/minimum values of active power, regenerative power, reactive power, apparent power, voltage, power factor, and frequency are reset to the current value. The maximum value of current is reset to the current value.
yAtt / hour	Energy value reset	The values of active energy, regenerative energy, LEAD reactive energy, LAG reactive energy, and apparent energy are reset to “0.”
CAnCL	Cancellation	Resetting is not performed.

4.7 Demand Measurement (Optional Measuring Function)

The PR300 (with the demand measuring function) can measure the average power or current during the set demand period.
This section explains the example display of measured value, measuring range, measurement operation, and example measurement. For setting conditions related to the demand measurement such as demand period, refer to Section 3.8, “Setting Demand Measurement Conditions.”

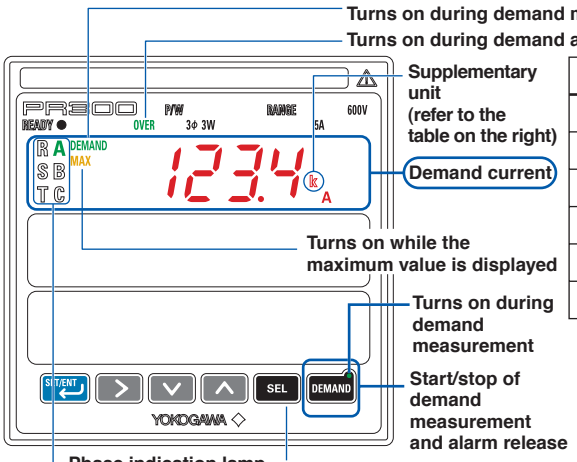
Example Demand Display and Measuring Ranges

Demand power



Secondary rated power × 1.2 × VT ratio × CT ratio	Measuring range
6 W to less than 100 W	0.00 to 99.99 W
100 W to less than 1 kW	0.0 to 999.9 W
1 kW to less than 10 kW	0 to 9999 W
10 kW to less than 100 kW	0.00 to 99.99 kW
100 kW to less than 1 MW	0.0 to 999.9 kW
1 MW to less than 10 MW	0 to 9999 kW
10 MW to less than 100 MW	0.00 to 99.99 MW
100 MW to less than 1 GW	0.0 to 999.9 MW
1 GW or greater	0 to 9999 MW

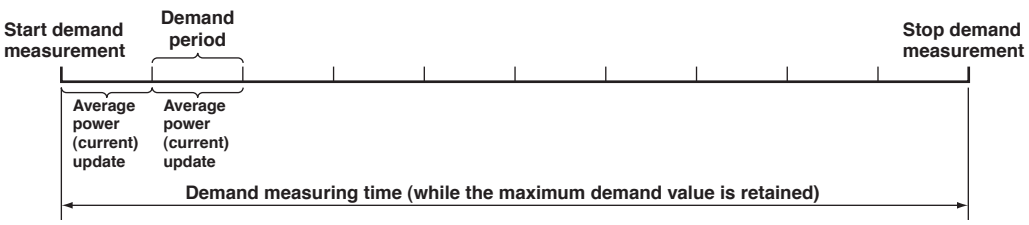
Demand current



Secondary rated power × 1.2 × CT ratio	Measuring range
0.06 A to less than 10 A	0.000 to 9.999 A
10 A to less than 100 A	0.00 to 99.99 A
100 A to less than 1 kA	0.0 to 999.9 A
1 kA to less than 10 kA	0 to 9999 A
10 kA to less than 100 kA	0.00 to 99.99 kA
100 kA to less than 1 MA	0.0 to 999.9 kA

Demand Measurement Procedure

Equation: (Pt - Ps) × (60 minutes × 60 seconds ÷ t)
Pt: Current integrated value
Ps: Integrated value at the beginning of the demand period
t: Demand elapsed time (data update period: 10 seconds)


Start demand measurement
Demand period
Stop demand measurement
Average power (current) update
Average power (current) update
Demand measuring time (while the maximum demand value is retained)

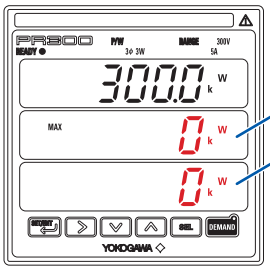
Operation for Demand Measurement

Demand measurement can be started and stopped by the operation key (DEMAND) or via communication. This section only explains control by the operation key (for operation via communication, refer to the PR300 Communication Interface User's Manual: IM77C01E01-10E). In the demand measurement mode, either the demand power or the demand current can be measured. To set either of these, refer to Section 3.8, "Setting Demand Measurement Conditions."

Start demand measurement

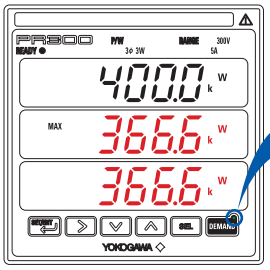
Operation

Measured Value screen



Hold down DEMAND for at least 3 seconds.

Measured Value screen



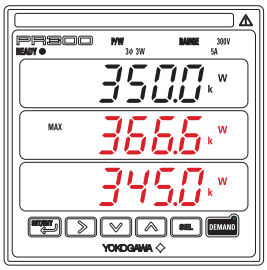
Demand measurement starts.

The measured value is updated every ten seconds.

Stop demand measurement

Operation

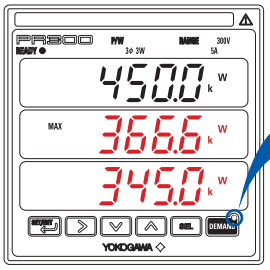
Measured Value screen



During demand power or current measurement

Hold down DEMAND for at least 3 seconds.

Measured Value screen

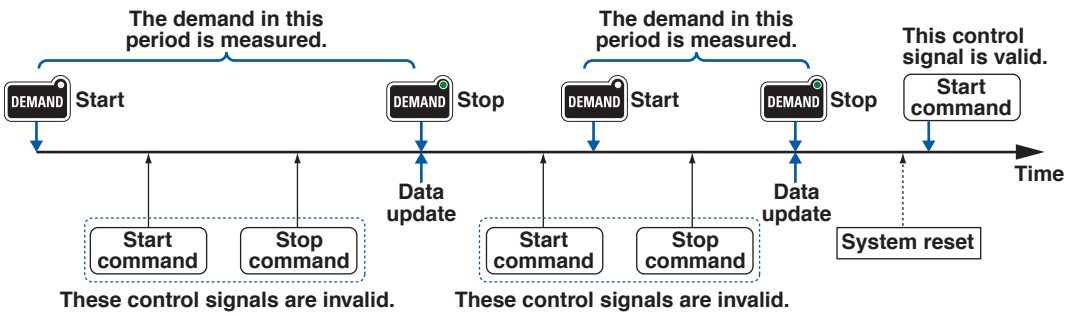


Demand measurement stops.

NOTE

- **Once the operation key is used for control to start and stop demand measurement, it is the only means for controlling until system reset* is performed. The same applies to control via communication.**
  *** System reset can be performed by turning off/on the power supply for the PR300 or by executing remote reset via communication.**
- **When the system is reset, the measured values of demand, maximum demand, and demand alarm status are reset to 0.**

Example operation to start/stop demand measurement



Demand Alarm

Demand alarm output

Function: When the set demand alarm point is exceeded, an alarm is output.
Output signal: Open collector
Output capacity: 30 V DC, 200 mA

Demand alarm release function

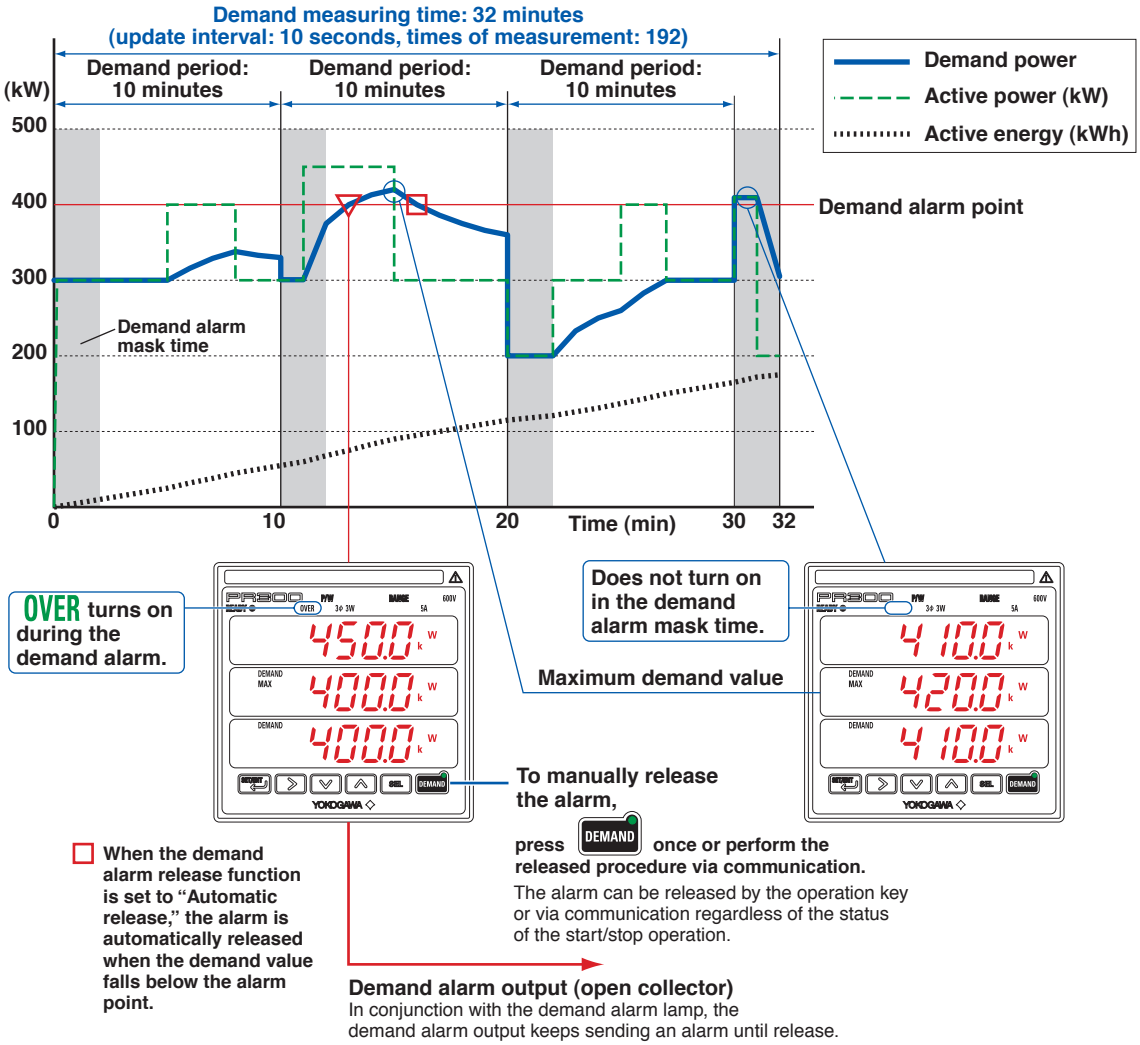
Automatic release: When the demand value falls below the demand alarm point, the alarm is released.
Manual release: The state of the alarm is maintained even if the demand value falls below the demand alarm point. It is released via communication or by digital input or the operation key.

Digital input
Number of inputs: 1
ON signal: 4.5 to 25 V DC
OFF signal: within ±1 V DC

Demand alarm mask time

The demand alarm mask time is the time between the beginning of the demand period and the set time, during which a demand alarm is not recognized.

Example Demand Measurement


Demand measuring time: 32 minutes
(update interval: 10 seconds, times of measurement: 192)
Demand period: 10 minutes
Demand period: 10 minutes
Demand period: 10 minutes
(kW)
500
400
300
200
100
0
10
20
Time (min)
30
32
Demand power
Active power (kW)
Active energy (kWh)
Demand alarm point
Demand alarm mask time
OVER turns on during the demand alarm.
Does not turn on in the demand alarm mask time.
Maximum demand value
To manually release the alarm,
press DEMAND once or perform the released procedure via communication.
The alarm can be released by the operation key or via communication regardless of the status of the start/stop operation.
When the demand alarm release function is set to "Automatic release," the alarm is automatically released when the demand value falls below the alarm point.
Demand alarm output (open collector)
In conjunction with the demand alarm lamp, the demand alarm output keeps sending an alarm until release.

Maximum demand value

The maximum demand value is the maximum value in the demand measuring time. This value is retained until system reset or start of the next demand measurement.

5.1 Error Display and Recommended Response

Error at the Time of Turning on the Power

Error display					Type of fault	Status					Recommended response
Upper display of measured value display	Power lamp	Phase and wire system lamp	Communi-cation lamp	Pulse lamp		Power calculation	Communi-cation	Pulse output (contact point)	Analog output	Demand alarm	
E000	Unstable	Off	Off	Off	RAM error	Disabled	Disabled	Disabled	Disabled	Disabled	**The product is broken. Request repair.**
E001					ROM error						
E002	Off	Normal action	Normal action		System data fault		(*1)				
E003					Calibration data fault						
E004					Parameter fault						
E005					Backup fault						

1*: The product operates under the following conditions:
Address: FF; Protocol: PC link with checksum; Baud rate: 9600 bps; Parity: None; Stop bit: 1 bit; Data length: 8 bits

Errors during Operation

Error display					Type of fault	Status					Recommended response
Upper display of measured value display	Power lamp	Phase and wire system lamp	Communi-cation lamp	Pulse lamp		Power calculation	Communi-cation	Pulse output (contact point)	Analog output	Demand alarm	
E006	Off	Normal action	Normal action	Normal action	EEPROM error	Normal operation	Normal operation	Normal operation	Normal operation	Normal operation	**The product is broken. Request repair.**
E007				Off	ADC error	Disabled		Disabled	Disabled	Disabled	
r-oUt **blinking** *2	On			Normal operation	Out-of-range input *2	Normal operation		Normal operation	Normal operation	Normal operation	**Confirm the input.** *2
Normal action	Blinks at intervals of 125 milliseconds.				Communi-cation error						**The product is restored when a normal frame is received.**

2*: The table below presents the details of out-of-range input:

Example	Error display	Recommended response
The input value is 120% or greater of primary rated power, current, or voltage.	r-oUt and the measured value appear alternately on the display.	The error is cleared by inputting a value smaller than 120%.
The input value is smaller than 10% of primary rated voltage.	r-oUt and the measured value appear alternately on the display.	The error is cleared by inputting a value 10% or larger.
The input value of power factor is out of the measuring range.	r-oUt and 60.500 or r-oUt and d0.500 appear alternately on the display.	The error is cleared by inputting a value in the measuring range.
The input value of frequency is out of the measuring range.	r-oUt and 45.0 appear alternately on the display.	The error is cleared by inputting a value in the measuring range.
The input value of reactive power is out of the measuring range.	r-oUt and the measured value appear alternately on the display.	The error is cleared by inputting a value 5% or greater of the primary rated current value.

5.2 Maintenance

This section explains the cleaning of the PR300.

Cleaning

The front panel and operation keys should be gently wiped with a dry cloth.

NOTE

Do not use alcohol, benzine, or any other solvents.

Appendix 1 Specifications of PR300

Measuring Function

Active energy (regenerative energy)	The active power up to present is integrated, and the integrated value is output in units of kWh or MWh (only kWh in the communication mode). The sign of integrated values of regenerative power is "–," and they are output as different data.
Reactive energy	LAG and LEAD reactive power up to present are integrated and output in units of kvarh or Mvarh (only kvarh in the communication mode). The signs of LAG reactive power and LEAD reactive power are "+" and "–," respectively.
Apparent energy	Apparent power up to present is integrated and output in units of kVAh or MVAh (only kVAh in the communication mode).
Optional active energy	While the control signal for optional integration is turned on, the active power is integrated and output in units of Wh. The control signal for optional integration is turned on via communication or by digital input.
Active power (regenerative power)	The present active power is output in units of W, kW, or MW. The sign of the value of regenerative power is always "–."
	Minimum resolution: 0.1 W (The minimum display resolution is the least significant value of [(secondary rated power)× VT ratio × CT ratio × 0.001])
	Maximum/minimum values: They are calculated in the range of [– rated power × 1.2] to [rated power × 1.2].
Apparent power	The present apparent power is output in units of VA, kVA, or MVA.
	Minimum resolution 0.1 VA (The minimum display resolution is the least significant digit of [(secondary rated power) × VT ratio × CT ratio × 0.001].)
	Maximum/minimum values They are calculated in the range of 0 to [(secondary rated power) × 1.2].
Reactive power	The present reactive power is output in units of var, kvar, or Mvar. The value of LEAD reactive power is output with a "–" sign. The value of LAG reactive power is output without a positive sign. (The signs of LEAD/LAG calculates according to the phase difference between V1 and I1.)
	Minimum resolution 0.1 var
	Maximum value It is calculated in the range between 0 and [(secondary rated power) × 1.2] (whichever is larger of the LEAD or LAG value).
	Minimum value It is calculated in the range between 0 and [(secondary rated power) × 1.2] (whichever is smaller of the LEAD or LAG value).
Power factor	The present LEAD power factor is output as a value with a "–" sign. The present LAG power factor is output as a value without a positive sign (a power factor is an rms value. The signs of LEAD/LAG calculates according to the phase difference between V1 and I1.).
	Minimum resolution 0.001
	Maximum value It is calculated in the range between 0 and [(rated value) × 1.2] (whichever is larger of the LEAD or LAG value).
	Minimum value It is calculated in the range between 0 and [(rated value) × 1.2] (whichever is smaller of the LEAD or LAG value).
Frequency	The frequency of the voltage line input to Voltage-1 is output in units of Hz.
	Minimum resolution 0.1 Hz
Demand	The average power or the average current in the set demand period is measured (refer to "4.7 Demand Measurement").

Power Items and Equations

(V and A are rms values.)

Phase and wire system	Apparent Power	Reactive Power (without using reactive power meter)	Power Factor
Single-phase two-wire system	VA = V×A	$Q = \sqrt{((VA)^2 - P^2)}$	
Single-phase three-wire system	VAi = Vi×Ai i = 1, 3 ΣVA = VA1+VA3	$Qi = \sqrt{((VAi)^2 - Pi^2)}$ i= 1, 3 ΣQ=Q1+Q2	ΣP / ΣVA (without using reactive power meter)
Three-phase three-wire system	VAi = Vi×Ai i = 1, 3 $\Sigma VA = \sqrt{3}/2(VA1+VA3)$	$Qi = \sqrt{((VAi)^2 - Pi^2)}$ i=1, 3 ΣQ=Q1+Q3	
Three-phase four-wire system	VAi = Vi×Ai i = 1, 2, 3 ΣVA = VA1+VA2+VA3	$Qi = \sqrt{((VAi)^2 - Pi^2)}$ i=1, 2, 3 ΣQ=Q1+Q2+Q3	
Three-phase four-wire system (2.5 element)	VAi = Vi×Ai i = 1, 3 $\Sigma VA = \sqrt{3}/2(VA1+VA3)$	$Qi = \sqrt{((VAi)^2 - Pi^2)}$ i=1, 3 Σvar=var1+var3	

* For distorted wave input, there may be differences between the PR300 and a measuring instrument that uses a different measurement principle.

Input Specifications

Phase and wire system	
	Universal three-phase three-wire system (switch the setting from single-phase two-wire system, single-phase three-wire system, or three-phase three-wire system)
	Universal three-phase four-wire system (switch the setting from single-phase two-wire system, single-phase three-wire system, three-phase three-wire system, or three-phase four-wire system)
	Three-phase four-wire system (2.5 element)
Frequency	45 to 65Hz
Rated input voltage	120 V; voltage range: 150 V (*) 240 V; voltage range: 300 V (*) 480 V; voltage range: 600 V (*)
Allowable input voltage	Within the voltage range
Rated input current	1 A; current range: 1 A (fixed) 5 A; current range: 5 A (fixed)
Allowable input current	1.2 times the current range (continuous); twice the current range (10 seconds); 10 times the current range (3 seconds)

*: The setting of the voltage range can be changed.

Rated input power and measuring range (when VT and CT are used, their respective secondary values)

Single-phase two-wire system

Input (AC)	Rated power	Input measuring range	Approximate consumed VA	
			Voltage	Current
120V/1A	100W	–120 to 120W	0.2VA	0.2VA
120V/5A	500W	–600 to 600W		
240V/1A	200W	–240 to 240W	0.4VA	
240V/5A	1000W	–1200 to 1200W		
480V/1A	400W	–480 to 480W	0.8VA	
480V/5A	2000W	–2400 to 2400W		

Single-phase three-wire system

Input (AC)	Rated power	Input measuring range	Approximate consumed VA	
			Voltage	Current
240V/1A	200W	–240 to 240W	0.2VA	0.2VA
240V/5A	1000W	–1200 to 1200W		

Three-phase three-wire system

Input (AC)	Rated power	Input measuring range	Approximate consumed VA	
			Voltage	Current
120V/1A	200W	–240 to 240W	0.2VA	0.2VA
120V/5A	1000W	–1200 to 1200W		
240V/1A	400W	–480 to 480W	0.4VA	
240V/5A	2000W	–2400 to 2400W		
480V/1A	800W	–960 to 960W	0.8VA	
480V/5A	4000W	–4800 to 4800W		

Three-phase four-wire system

Input (AC)	Rated power	Input measuring range	Approximate consumed VA	
			Voltage	Current
120V/1A	300W	–360 to 360W	0.2VA	0.2VA
120V/5A	1500W	–1800 to 1800W		
240V/1A	600W	–720 to 720W	0.4VA	
240V/5A	3000W	–3600 to 3600W		
480V/1A	1200W	–1440 to 1440W	0.8VA	
480V/5A	6000W	–7200 to 7200W		

When VT and CT are used, the input measuring range of the primary input power is smaller than 10 GW, and the value calculated by the following equation is within the input measuring range above.

$$\text{Input measuring range (W)} = \frac{\text{Primary input power (W)}}{\text{VT ratio} \times \text{CT ratio}}$$

Digital Input Specifications

It is used for control signals for optional integration or demand alarm release.	
	Control signal for optional integration: Starts and stops measurement of optional active energy.
	Demand alarm release (with demand measuring function): Releases demand alarm.
Number of inputs	1
Input signal	Voltage signal; ON signal: 4.5 to 25 V DC; OFF signal: within ±1 V DC
(Note 1)	The control signal for optional integration can be controlled via communication. Once it is controlled by digital input, it is the only means for controlling until the system is reset. System reset can be performed via communication or by turning off/on of the power of the PR300.
(Note 2)	In the PR300 with the demand measuring function, digital input can be used only to release the demand alarm and cannot be used for control signals for optional integration.

Analog Output Specifications (additional output function)

The measured value is converted into the direct current signal for outputting.		
Measurement item for output		
	One of active power, reactive power, apparent power, voltage-1, voltage-2, voltage-3, current-1, current-2, current-3, power factor, and frequency	
Output signal	4 to 20 mA DC	
Output accuracy	Measurement accuracy of measurement item for output +(±0.5% of F.S.)	
Allowable load resistance		
	0 to 600 Ω	
Response speed	Within 2 seconds (±1% of final value)	
Set items	Selection of measurement item for output, and lower, and upper limits of scaling	
Settings of lower/upper limits of scaling according to measurement item for output		
	Active power	minus–rated power (W) to rated power (W)
	Reactive power	minus–rated power (var) to rated power (var)
	Apparent power	0 to rated power (VA)
	Voltage-1 to 3	0 to rated voltage (V)
	Current-1 to 3	0 to rated current (A)
	Power factor	–0.5 to 1 to 0.5
	Frequency	45 to 65 (Hz)

Pulse Output Specifications (additional output function)

The pulse proportional to the energy is output.	
Measurement item for output	
	One of active energy, regenerative energy, LEAD reactive energy, LAG reactive energy, and apparent energy
Number of outputs	1
Output signal	Open collector
Contact capacity	30 V DC, 200 mA
Pulse unit	0.1 to 5000.0 kWh/pulse (changeable in increments of 100 Wh)
Set items	Measurement items for output, pulse unit, and ON pulse width
ON pulse width	The ON time of the output pulse is shown.
	Setting range: 10 to 1270 ms (changeable in increments of 10 ms) Setting should be made not to exceed the value of the maximum ON pulse width calculated by the following equation: Maximum ON pulse width (ms) = $\frac{\text{Pulse unit [kWh/pulse]} \times 3600 \times 1000^2}{\text{Secondary rated power [W]} \times \text{VT ratio} \times \text{CT ratio} \times 1.2 \times 2}$ The pulse unit of reactive power is kvarh/pulse, and that of apparent power is kVAh/pulse.

A
Appendix

Demand Alarm Output Specifications (optional measuring function)

When the demand measurement value exceeds the set demand alarm point, an alarm is triggered.

Output signal	Open collector
Contact capacity	30 V DC, 200 mA
Set alarm range	1 to 1000 kW (during demand power measurement); 1 to 1000 A (during demand current measurement)
Alarm release function	
Automatic release:	When the measured value falls below the demand alarm point during alarm output, the alarm is released.
Manual release:	Used to keep the alarm turned on or to release it by digital input or the operation key, or via communication.

* The demand alarm mask time can be set for the PR300.

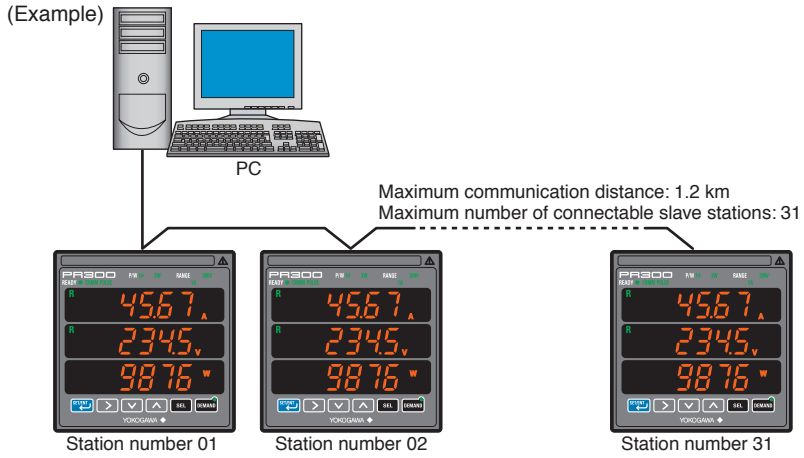
The demand alarm mask time is the time between the beginning of the demand period and the set time, during which an alarm is not recognized.

Allowable range of set time: 1 minute to demand period

Communication Specifications

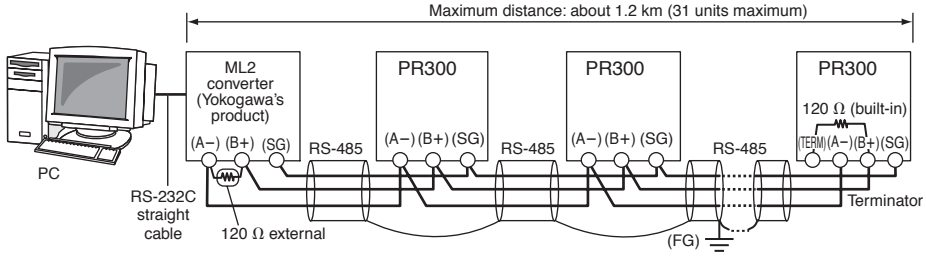
RS-485 communication

Via RS-485 communication, various measured values are read, and values are written to various parameters using the command/response method.



Protocol	PC link (without checksum), PC link (with checksum), Modbus/ASCII, and Modbus/RTU	
Transmission distance	Approximately 1.2 km maximum (with 24 AWG twisted-pair cable(s))	
Connection method	Multi-drop connection (32 units including higher-level ones)	
Station number	01 to 99 (maximum number of connectable units (PCs, etc.): 31) (recommended value: 01 to 31)	
Transmission method	Half duplex communication	
Synchronization system	Start-stop synchronization	
Baud rate	19200/9600/2400 bps	
Xon/Xoff control	None	
Data format	Data length	8 bits, 7 bits
	Parity	None, even number, odd number
	Stop bit	1 bit, 2 bits

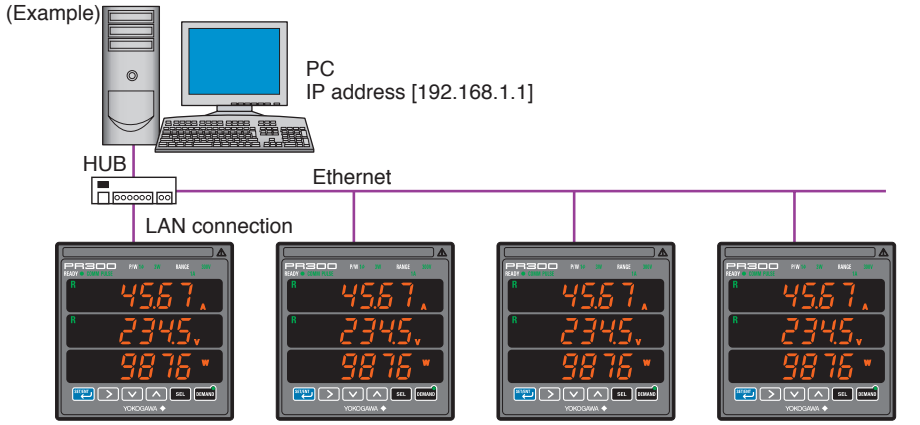
Example connection chart



<Note>
For RS-485 communication, the PR300 employs the two-wire system.
SG: Connection to Terminal SG is made to adjust the signal level of the RS-485 communication line.
FG: For noise protection, a shield line must be connected to all wires in the RS-485 communication line and grounded at one location.

Ethernet communication

Via Ethernet communication, various measured values are read, and values are written to various parameters using the command/response method.



Connectable to an IEEE802.3-compliant network (10BASE-T/100BASE-TX).

Higher-level device (PC, etc.)

Application layer	MODBUS/TCP
Transport layer	TCP, UDP
Network layer	IP, ICMP, ARP
Data link layer	Ethernet
Physical layer	10BASE-T/100BASE-TX

Communication specifications

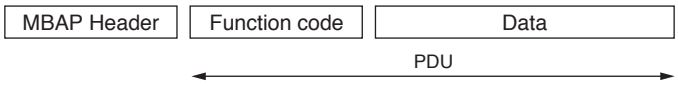
	Protocol	Modbus/TCP
	Access control	CSMA/CD
	Baud rate	10Mbps/100Mbps
	Maximum segment length	100m (between HUB and module)
	Maximum connection configuration Cascade	4 segments maximum (10BASE-T) 2 segments maximum (100BASE-TX) (number of cascade connection units of HUB)
IP address	The IP address can be set using the operation keys on the front side of the PR300.	

Modbus/TCP function

Code	Function	Description
03	Reads data from multiple D registers	Capable of reading data from up to 64 registers continuously.
06	Writes data into D register	Capable of writing data into one resiter.
08	Performs loopback test	Capable of performing a communication test.
16	Writes data into multiple D registers	Capable of writing data into up to 32 registers continuously.

Outline of Modbus/TCP protocol

The structure of the Modbus/TCP protocol is as follows:



The Simple Protocol Data Unit (PDU) is the same as Modbus/RTU (Modbus protocol via serial communication).

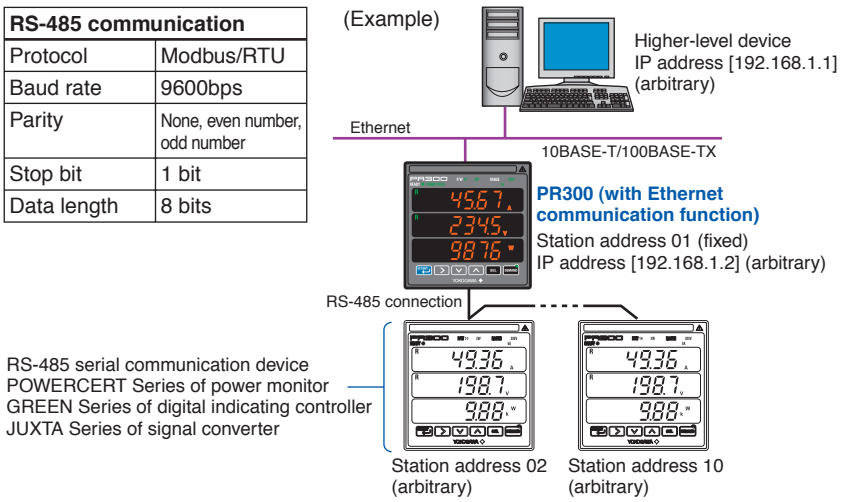
The Modbus Application Protocol Header (MBAP) is made of the following seven bytes:

Byte No	0	1	2	3	4	5	6
Contents	Transaction ID		Protocol ID		Number of bytes		Unit ID

Ethernet - Serial gateway function

Equipped with an Ethernet communication connector and an RS-485 communication terminal, the PR300 receives a Modbus/TCP command from Ethernet and relays it to the RS-485 communication terminal. The PR300 allows connection to RS-485 serial communication devices via the network.

RS-485 communication	
Protocol	Modbus/RTU
Baud rate	9600bps
Parity	None, even number, odd number
Stop bit	1 bit
Data length	8 bits



(Note) If Ethernet communication is used, the RS-485 communication interface is used specifically for the Ethernet-serial gateway function. Therefore, it is not possible for a higher-level device such as a PC to access the PR300 via the RS-485 communication interface.

Standard Performance

Accuracy rating	Active energy/optional active energy (Wh)	±0.5% (EN60687 accuracy: Class 0.5 or equivalent)
	Active power	±0.5% of F.S.
	Voltage (V)	±0.25% of F.S. (voltage rms)
	Current (A)	±0.25% of F.S. (current rms)
	Frequency (Hz)	±0.5Hz
	Demand	±0.5%
Calculation accuracy	The value is calculated to ±1 digit from the measured value for reactive energy, apparent energy, reactive power, apparent power, power factor, or current.* * Current is only for the 2.5-element measurement.	
Backup upon power failure	The last integrated values obtained immediately before the power failure are held for effective energy, regenerative energy, reactive energy, and apparent energy.	

Insulation resistance	Between each of the voltage input, current input, power source, ground terminal, digital input, pulse output, analog output, communication output, and alarm output terminals: 100 MΩ minimum (at 500 V DC)
Withstand voltage	Between each of the voltage input, current input, power source, and ground terminals: 2500 V AC for 1 minute
	Between all of the voltage input, current input, and power source terminals and the (digital input, pulse output, analog output, communication output, and alarm output terminals): 2500 V AC for 1 minute
	Between each of the digital output, pulse output, analog output, communication output, and alarm output terminals: 1000 V AC for 1 minute
Impulse withstand voltage	Between all of the voltage input, current input, and power source terminals and the ground terminal Between all of the output and ground terminals and all of the voltage and current inputs: 6 kV (1.2/50 ms), 10 times for positive and negative
Magnetic field effect	Within accuracy range at 400 A/m or less
Ambient temperature effect	0.01%/°C for a rate of temperature change of 10°C/h (0.05In ≦ I ≦ Imax and power factor = 1) 0.02%/°C for a rate of temperature change of 10°C/h (0.1In ≦ I ≦ Imax and power factor = LAG0.5) In: rated current; I: present current value
Effect of power source voltage change	0.05% for changes within the operation range of the power source (0.01In and power factor = 1) In: rated current
Effects of input frequency	0.1% for variations of ±5% (power factor = 1 and LAG0.5)
Dustproofness and dripproofness	IP5X
Power source	100 to 240 V AC/DC ±10%
Power consumption	AC driving 10 VA maximum
	DC driving 5 W maximum

Compliance with Safety and EMC Standards

Safety standards	Compliant with IEC/EN61010-1 Under application for UL611010 approval
	Measurement category: 600V CAT.III

Measurement category	Descriptions	Remarks
CAT.I	Circuits not directly connected to the main power supply	
CAT.II	Circuits directly connected to low-voltage facility	House-use equipment, portable tools, etc.
CAT.III	Circuits in building facility	Switchboards, circuit breakers, etc.
CAT.IV	Power sources for low-voltage facility	Overhead lines, cable systems, etc.

	Pollution degree: 2 (IEC/EN61010)
	Rated measurement input voltage: 600 V AC (between terminals)
EMC standard	Compliant with EN61326 During testing, the instrument continues to operate at a measurement accuracy within ±20%.

Environmental Conditions

Normal operating conditions		
	Warm-up time	At least 30 minutes
	Ambient temperature	0 to 50°C (reference temperature: 23±2°C)
	Temperature change	10°C/h or less
	Ambient humidity	20 to 90% RH (no condensation)
	Magnetic field	400A
	Continuous vibration	10 to 60 Hz, 0.035 mm, 75 minutes; 60 to 150 Hz, 4.9 m/s^2, 75 minutes
	Shock	98 m/s^2 maximum (for shock time of 11 ms)
	Mounting orientation	Vertical surface installation only
	Installation altitude	2000 m maximum
Effect on operation conditions		
	Effect of ambient temperature	Analog output: ±0.05% of F.S./°C or less
	Effect on power source variation	Analog output: ±0.05% of F.S./°C or less
Transport and storage conditions		
	Temperature	-20 to 70°C
	Humidity	5 to 95% RH (no condensation)
	Shock and dropping of package	90 cm (provided that an external packing box is used)

Mounting and Shape

Materials	Casing	Polycarbonate resin (PC), UL94 V-0
	Terminal block	Polybutylene terephthalate (PBT), UL94 V-0
	Terminal cover	Polyamide resin (PA6), UL94 V-2
Mounting method	Panel mounting	
Connection Method	M3 screws for terminal connections (output, RS-485 communication, and control signal for optional integration)	
	M4 screws for terminal connections (input and power)	
	RJ45 connection (Ethernet communication, when the Ethernet communication function is specified)	
External Dimensions (including terminal cover)		
	110 × 110 × 128 mm (H × W × D)	
	96 × 96 × 126 mm (H × W × D)	
Weight	Approx. 600 g (when accessories such as mounting bracket are attached)	

Related Products (sold separately)

Clamp-on current transformer	CTW130	800A/5A
	CTW100	500A/5A
	CTW35	300A/1A
	CTW20	200A/1A
	CTW15	100A/1A
	CTW10	100A/1A
Separate current transformer	CTU100	500A/5A
	CTU20	200A/1A
	CTU10	100A/1A

Appendix 2 System Reset

There are two methods of performing system reset, all of which reset the same measured values and actions:

- Turn off the power of the PR300 and then turn it on again.
- Execute remote reset via communication (for remote reset, refer to the PR300 Power and Energy Meter Communication Interface User's Manual [RS-485 and Ethernet Communications]: IM 77C01E01-10E)

Measured values to be reset

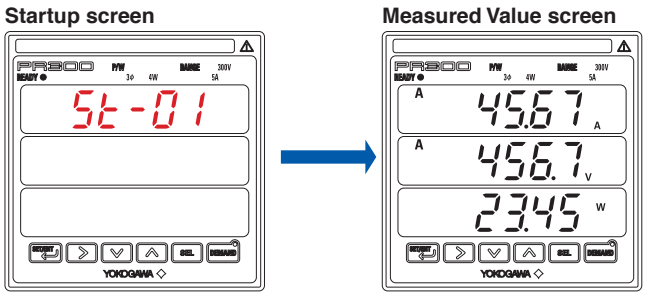
If system reset is executed, the following measured values will be reset.

- Maximum value, minimum value, and instantaneous value of voltage
- Maximum value and instantaneous value of current
- Optional active energy value

The values of active energy (regenerative energy), reactive energy, and apparent energy, as well as those set to parameters are not reset and are saved.

Actions after reset

The PR300 displays the Startup screen (where the station number can be seen) and then the Measured Value screen.

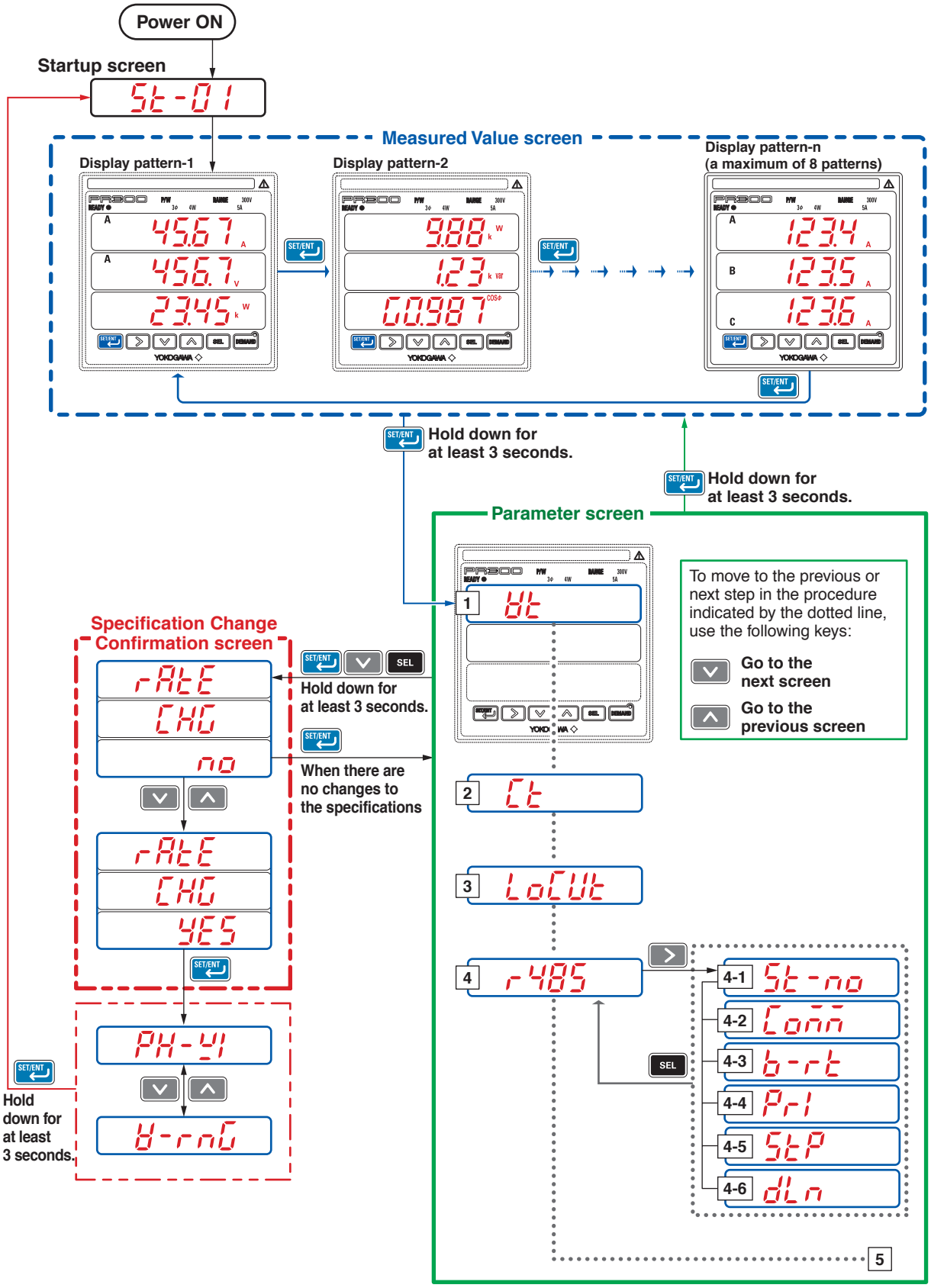


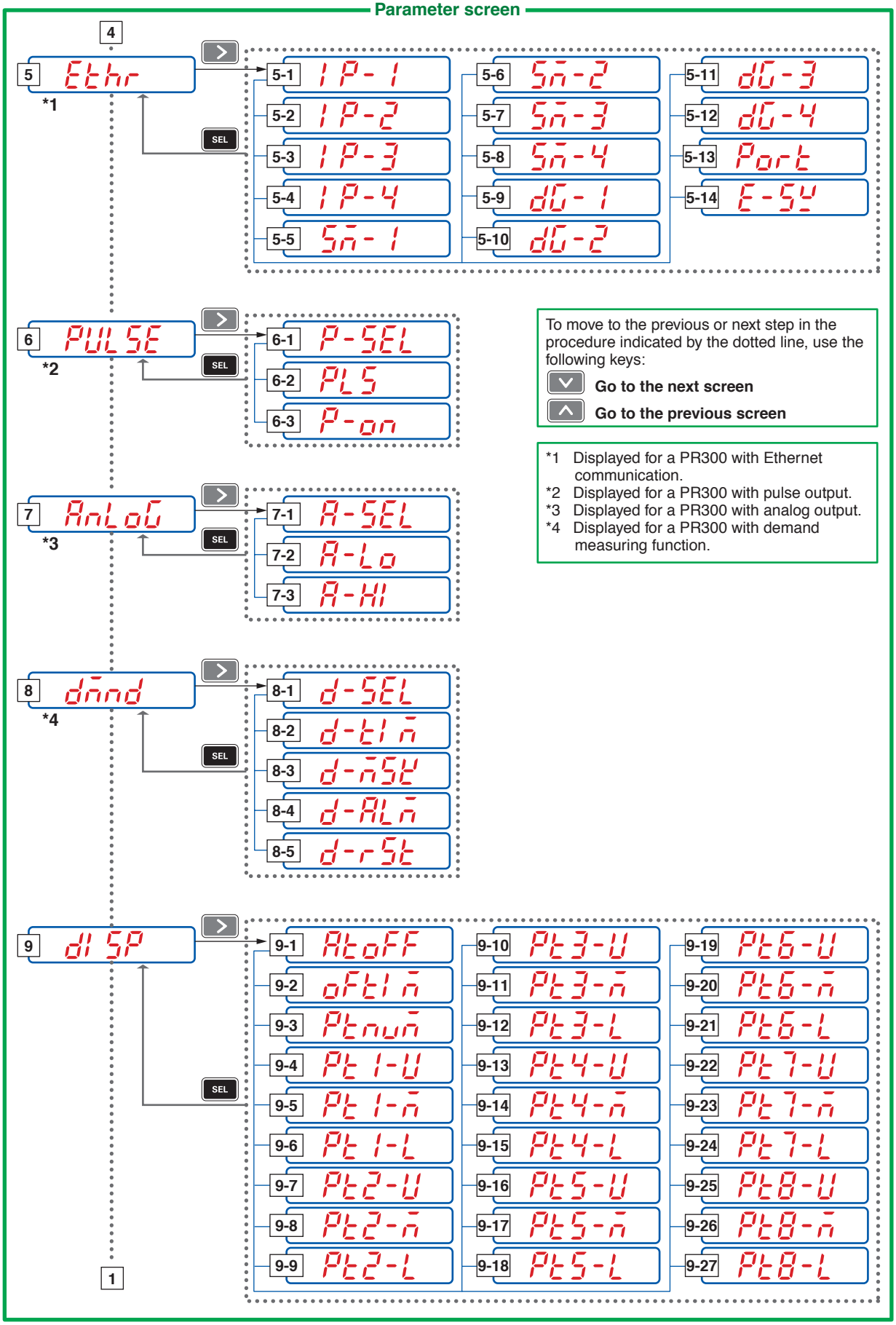
Reset switch

As shown in the figure below, the reset switch is on the rear of the PR300. Use something thin (e.g. a precision driver) to press the switch once to execute system reset.

Appendix 3 Parameter Setting Procedure

Some of the following parameters cannot be displayed due to the specifications of the PR300.





To move to the previous or next step in the procedure indicated by the dotted line, use the following keys:

Go to the next screen

Go to the previous screen

*1 Displayed for a PR300 with Ethernet communication.
*2 Displayed for a PR300 with pulse output.
*3 Displayed for a PR300 with analog output.
*4 Displayed for a PR300 with demand measuring function.

A Appendix

Appendix 4 Parameter List

Display Order	Parameter Symbol	Parameter Name	Setting Type	Setting Range (Details)	Initial Value (Factory-set Value)
1	Vt	VT ratio	Integral numeric value	1 to 6000	1
2	Ct	CT ratio	Floating-point numeric value	0.05 to 32000	1.00
3	LoCUt	Integrated low-cut power	Fixed-point numeric value	0.05 to 20.00 (%)	0.05
4	r485	RS-485 communication menu	———	Menu to shift to the parameters of RS-485 communication	———
4-1	St-no	Station number	Integral numeric value	1 to 99	1
4-2	Conn	Protocol	Selection	PC link without checksum PCLV1 PC link with checksum PCLV2 Modbus/ASCII n ASC Modbus/RTU n rtU Modbus/TCP (*1) n tCP	PC link with checksum
4-3	b-rt	Baud rate	Selection	2400 bps 2400 9600 bps 9600 19200 bps 19200	9600 bps
4-4	Pri	Parity	Selection	NONE nonE EVEN EVEn ODD odd	NONE
4-5	StP	Stop bit	Selection	1 bit 1 2 bits 2	1
4-6	dLn	Data length (*2)	Selection	8 bits 8 7 bits 7	8
*1 Only the PR300 with the Ethernet communication function can be selected. *2 Select "8" if you selected Modbus/RTU for the protocol.					
5	Ethr	Ethernet communication menu (Displayed only for a PR300 with the Ethernet communication function.)	———	Menu to shift to the parameters of Ethernet communication	———
5-1	IP-1	IP address-1	Integral numeric value	0 to 255	192
5-2	IP-2	IP address-2		0 to 255	168
5-3	IP-3	IP address-3		0 to 255	1
5-4	IP-4	IP address-4		0 to 255	1
5-5	Sn-1	Subnet mask-1	Integral numeric value	0 to 255	255
5-6	Sn-2	Subnet mask-2		0 to 255	255
5-7	Sn-3	Subnet mask-3		0 to 255	255
5-8	Sn-4	Subnet mask-4		0 to 255	0

Display Order	Parameter Symbol	Parameter Name	Setting Type	Setting Range (Details)	Initial Value (Factory-set Value)
5-9	dG-1	Default gateway-1	Integral numeric value	0 to 255	0
5-10	dG-2	Default gateway-2		0 to 255	0
5-11	dG-3	Default gateway-3		0 to 255	0
5-12	dG-4	Default gateway-4		0 to 255	0
5-13	Port	Port number	Integral numeric value	502, 1024 to 65535	502
5-14	E-Sy	Ethernet setting switch	Selection	ON (Enable the settings) on OFF oFF	OFF
6	PULSE	Pulse output menu (Displayed only for a PR300 with pulse output.)	———	Menu to shift to the parameters of pulse output	———
6-1	P-SEL	Measurement item for pulse output	Selection	Active energy Wh Regenerative energy -Wh LEAD reactive energy -varh LAG reactive energy varh Apparent energy VAh	Active energy
6-2	PLS	Pulse unit	Fixed-point numeric value	0.1 to 5000.0 (k)	1.0
6-3	P-on	ON pulse width	Integral numeric value	10 to 1270 (ms)	50
7	AnLoG	Analog output menu (Displayed only for a PR300 with analog output.)	———	Menu to shift to the parameters of analog output	———
7-1	A-SEL	Measurement item for analog output	Selection	Active power WAtt Reactive power var Apparent power VA Voltage-1 V-1 Voltage-2 V-2 Voltage-3 V-3 Current-1 A-1 Current-2 A-2 Current-3 A-3 Power factor PF Frequency Fr-Eq	Active power
7-2	A-Lo	Lower limit of scaling	Fixed-point numeric value	0.0 to 50.0 (%)	50
7-3	A-HI	Upper limit of scaling	Fixed-point numeric value	50.0 to 100.0 (%)	100
8	dmnd	Demand measurement menu (Displayed only for a PR300 with demand measuring function.)	———	Menu to shift to the parameters of demand measurement	———
8-1	d-SEL	Demand power/current	Selection	Active power WAtt Current A	Active power
8-2	d-tIm	Demand period	Integral numeric value	1 to 60 (min) (Demand alarm mask time to 60) (min)	30

Display Order	Parameter Symbol	Parameter Name	Setting Type	Setting Range (Details)	Initial Value (Factory-set Value)
8-3	d-n5t	Demand alarm mask time	Integral numeric value	1 to 59 (min) (1 to demand period) (min)	1
8-4	d-ALn	Demand alarm point	Integral numeric value	1 to 1000 (kW) or 1 to 1000 (A)	100
8-5	d-rSt	Demand alarm release function	Selection	Automatic release Auto Manual release nAnuL	Automatic release
9	dISP	Display setting menu	———	Menu to shift to the parameters of display setting	———
9-1	AtoFF	Indicator-out mode	Selection	ON on OFF oFF	OFF
9-2	oFtIn	Indicator-out mode wait time	Integral numeric value	1 to 60 (min)	10 (min)
9-3	Ptnun	Number of display patterns	Integral numeric value	1 to 8	1
9-4	Pt 1-U	Display pattern-1 upper display	Selection	A measurement item can be selected from the following: None nonE Active energy WH Regenerative energy -WH LEAD reactive energy -varh LAG reactive energy varh Apparent energy VAh Active power WAtt Reactive power var Apparent power VA Voltage (phase switch indication) U Voltage-1 U-1 Voltage-2 U-2 Voltage-3 U-3 Current (phase switch indication) A Current-1 A-1 Current-2 A-2 Current-3 A-3 Power factor PF Frequency FrEQ Optional active energy WhoP Demand value dmnd Maximum demand value d-nAll	Current (phase switch indication)
9-5	Pt 1-n	Display pattern-1 middle display			Voltage (phase switch indication)
9-6	Pt 1-L	Display pattern-1 lower display			Active power
9-7	Pt2-U	Display pattern-2 upper display			Active power
9-8	Pt2-n	Display pattern-2 middle display			Reactive power
9-9	Pt2-L	Display pattern-2 lower display			Power factor
9-10	Pt3-U	Display pattern-3 upper display			Active energy
9-11	Pt3-n	Display pattern-3 middle display			LEAD reactive energy
9-12	Pt3-L	Display pattern-3 lower display			Apparent energy
9-13	Pt4-U	Display pattern-4 upper display			Current-1
9-14	Pt4-n	Display pattern-4 middle display			Current-2
9-15	Pt4-L	Display pattern-4 lower display			Current-3
9-16	Pt5-U	Display pattern-5 upper display			Voltage-1
9-17	Pt5-n	Display pattern-5 middle display			Voltage-2
9-18	Pt5-L	Display pattern-5 lower display			Voltage-3
9-19	Pt6-U	Display pattern-6 upper display			Current (phase switch indication)

Display Order	Parameter Symbol	Parameter Name	Setting Type	Setting Range (Details)	Initial Value (Factory-set Value)
9-20	Pt6-n	Display pattern-6 middle display	Selection	Refer to the previous page.	Voltage (phase switch indication)
9-21	Pt6-L	Display pattern-6 lower display			Frequency
9-22	Pt7-U	Display pattern-7 upper display			Current (phase switch indication)
9-23	Pt7-n	Display pattern-7 middle display			Active power
9-24	Pt7-L	Display pattern-7 lower display			Power factor
9-25	Pt8-U	Display pattern-8 upper display			Active power
9-26	Pt8-n	Display pattern-8 middle display			Maximum demand value
9-27	Pt8-L	Display pattern-8 lower display			Demand value

Range of Phase and Wire System Options and Voltage Range Options

Phase and Wire System

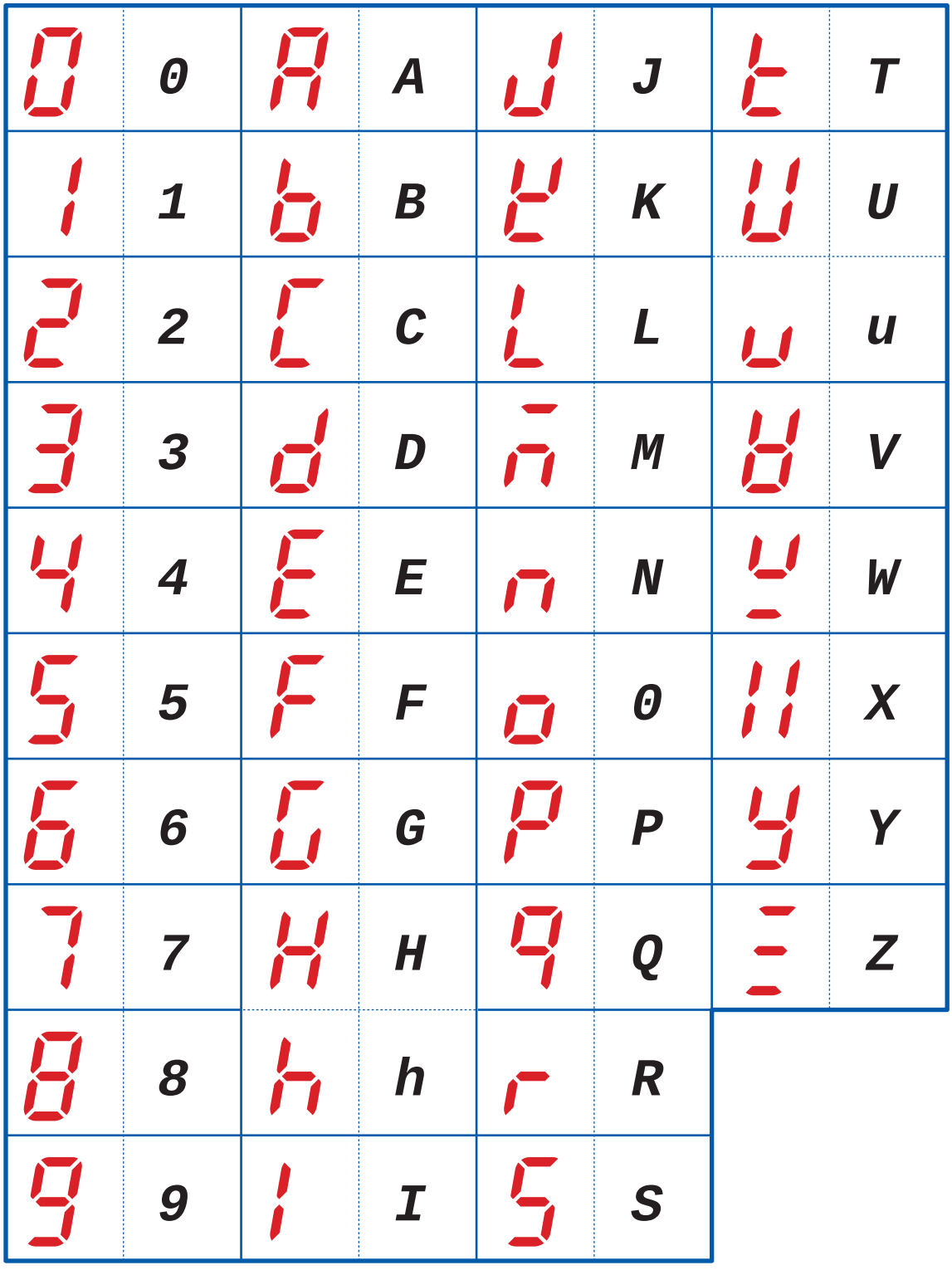
Parameter Symbol	Parameter Name	Setting Type	Model and Suffix Codes	Setting Range (Details)	Initial Value (Factory-set Value)
PH-yI	Phase and wire system	Selection	PR300-3□□□□-6□-0	Single-phase two-wire system 1P2y	Three-phase three-wire system
				Single-phase three-wire system 1P3y	
				Three-phase three-wire system 3P3y	
			PR300-4□□□□-6□-0	Single-phase two-wire system 1P2y	Three-phase four-wire system
				Single-phase three-wire system 1P3y	
				Three-phase three-wire system 3P3y	
				Three-phase four-wire system 3P4y	
			PR300-5□□□□-6□-0	Three-phase four-wire system (2.5 element) 2.5E	Three-phase four-wire system (2.5 element)

Voltage Range

Parameter Symbol	Parameter Name	Setting Type	Setting Range (Details)	Initial Value (Factory-set Value)
U-rnG	Voltage range	Selection	150V 150U	300V
			300V 300U	
			600V 600U	

Appendix 5 Alphanumeric Characters Table for 7-segment LED

The PR300 uses a 7-segment LED as its display. It displays alphanumeric characters according to the table below (however, the table also contains characters that are not used by the PR300).



NOTE

The PR300 displays H and U in two different forms (uppercase and lowercase) for easy viewing.

Index

A

Attaching the dust cover 1-9

C

Compliance with Safety and EMC Standards A-7
Component Names and Functions 2-1

D

DIN 96-square Instrument Size 1-3
Demand Alarm 4-14
Demand Display and Measuring Ranges 4-12
Demand Measurement 4-12
Demand alarm mask time 4-14
Demand alarm output 4-14
Demand alarm release function 4-14

E

Environmental Conditions A-8
Error at the Time of Turning on the Power 5-1
Errors during Operation 5-1
Example Display and Measuring Ranges of Frequency 4-5

H

How to Switch between Instantaneous Value, Maximum 4-5

I

Integrated Low-cut Power 3-4

J

JIS 110-square Instrument Size 1-1

L

Locking and Unlocking Parameters 3-20

M

Measurement Items 4-1
Measuring Range of Active Energy and Regenerative 4-7
Measuring Range of Apparent Energy 4-7
Measuring Range of LEAD Reactive Energy and LAG Re . 4-7
Measuring Ranges of Active Power (Regenerative Pow 4-3
Measuring Ranges of Apparent Power 4-3
Measuring Ranges of Current 4-4
Measuring Ranges of Power Factor 4-4
Measuring Ranges of Reactive Power 4-3
Measuring Ranges of Voltage 4-4

O

Operation for Energy Value Display 4-8
Optional Integrating Function 4-9

P

Parameter List A-12
Parameter Setting Procedure A-10
Phase Switching for Voltage and Current 4-6
Power Items and Equations A-2

R

Range of Phase and Wire System Options 2-3
Range of Voltage Range Options 2-5
Resetting Measured Values 4-10

S

Setting Analog Output Conditions 3-12
Setting Demand Measurement Conditions 3-14
Setting Ethernet Communication Conditions 3-8
Setting Pulse Output Conditions 3-10
Setting RS-485 Communication Conditions 3-6
Setting the CT Ratio 3-3
Setting the Integrated Low-cut Power 3-4
Setting the Measured Value Display Pattern 3-16
Setting the Phase and Wire System 2-2
Setting the VT Ratio 3-2
Setting the “Indicator-out” 3-19
Specifications of PR300 ..... A-1
- Analog Output Specifications A-3
- Communication Specifications A-4
- Compliance with Safety and EMC Standards A-7
- Demand Alarm Output Specifications A-4
- Digital Input Specifications A-3
- Environmental Conditions A-8
- Input Specifications A-2
- Measuring Function A-1
- Mounting and Shape A-8
- Pulse Output Specifications A-3
- Related Products A-8
- Standard Performance A-6
- Switching Display Pattern 4-2

System Reset A-9

V

Voltage Range 2-4

W

Wiring 1-5